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ABSTRACT

This publication contains a final report and curriculum materials for a workplace literacy partnership program. The final project report includes the following: a project overview, goal analysis, statistical data on learners served, summaries on instruction, recommendations, dissemination and evaluation activities, and instruments with results. The training packets cover these topics: learning to learn and to think on the job, improving communication skills on the job, improving writing skills on the job, relating at work, mathematics, and problem solving through teams. The learning to learn and to think on the job course consists of prechecks, inventories and surveys, and checklists. The communicating at work training packet consists of lessons that may include objectives, instructional materials and activities, and pre- and post-checks. The writing skills training packet consists of two lessons with objective, purpose, and procedure. The relating at work training packet consists of objectives, instructional materials, and a precheck. The math manual provides materials for five 2-hour classes. It contains a user's manual, course outline, pretest, instructional materials and exercises/activities, and posttest. General areas covered include arithmetic review, basic geometry, measurement, and overview of statistics. The problem solving through teams course consists of materials for nine 2-hour sessions. Each session contains these components: seminar presentations, reading assignment, and project assignment. (YLB)

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2000
DIAMONITE
W.R. Grace
THE OHIO STATE UNIVERSITY
Agricultural Technical Institute

DIAMONITE 2000

TRAINING MANUAL

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FINAL PROJECT REPORT

DIAMONITE 2000: A WORKPLACE LITERACY PARTNERSHIP PROGRAM

A formal partnership between

The Ohio State University
Agricultural Technical Institute

and

Diamonite Products

Demonstration Grant #V 198A30036

January 1, 1993 - August 31, 1994

Funded by the U.S. Department of Education

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Project Overview

Beginning in June, 1993, and ending on June 9, 1994, this partnership offered 13 sections of training. Each class met forty hours: twice a week for two hours for 10 weeks. Each class returned 4-6 weeks later for a two-hour follow-up seminar to assess the impact of the training after some time had passed. Total training time for Diamonite employees was 546 in-class hours.

The program was truly a partnership: the On-Site Coordinator, from Diamonite Products, partnered with the Project Director, from Ohio State University's Agricultural Technical Institute (OSU/ATI), to make all project decisions. An advisory board was formed to provide counsel on program implementation strategies, evaluation administration and curriculum materials. The advisory board was comprised of employees at all levels of the Diamonite facility (frontline employees, supervisors and management personnel) and the On-Site Coordinator and Project Director. The board met throughout the project. Diamonite management and OSU/ATI administrators met periodically throughout the project for program updates.

Focus groups comprised of representatives of management, supervision and frontline associates were conducted early in the planning stages to assess views and attitudes of the planned project. The information was critical to planning all project phases and, ultimately, to the very successful outcome of this training project.

An all plant Kick-off was held where top management personnel, including the On-Site Coordinator, introduced the program and demonstrated support for the program. The Project Director explained the program, distributed a projected timeline for implementation and answered questions. At this time a survey was conducted to determine why associates would attend any training and to determine interest in participating. Associates were asked to sign-up at this time and opportunities to sign-up were on-going throughout the project.

Meetings were held with supervisory personnel to assure they understood the project and their roles and to gain "buy-in" and support. Instructors toured the facility and met with supervisors to gain an initial understanding of how the facility operated.

Appraisals assessing benchmark data were administered to all facility personnel and private, one-on-one sessions were held where appraisal results were presented and explained to each associate. Management received an aggregate report of results. Appraisals assessed mathematics, reading comprehension and expressive writing. Each associate received an individualized learning plan.

Task analyses were conducted on competent associates recommended by department supervisors. Curriculum materials were custom designed using Diamonite materials and each participant received a notebook of materials.

Three instructors taught sections on Managing Stress, Thinking, Listening, Setting Goals, Reading, Writing, Relating, Mathematics, and Problem Solving Through Teams. Instructors were tenured professionals who were skilled in understanding the needs of the adult learner. Instructors also staffed regularly throughout the project: staff development included learning about the needs of adult learners and working together to assure content continuity.

Each module was designed to include a pre- and post-test. Assessment was administered mid-point (approximately 5 weeks into the training), at the conclusion of the 10-week class and at the follow-up session. Evaluations were also administered to supervisors to assess each associate who participated in training and to assess the total impact of the training on the department.

Data was collected on associate expectations at the time of enrollment, personal goals, knowledge of job skill requirements, and active/passive learning preferences.

A graduation ceremony and reception was held at the end of each class where associates received praise by the plant manager, awarded a certificate of completion and awarded a pen inscribed with "Diamonite 2000."

Goal Analysis

It should be noted that during the time this project was implemented, the company was sold and process, equipment and product changes took place which impacted on the following results.

Goal #1 *The project will recruit and assess a minimum of 250 employees as project participants.*

Recruitment included associate small group meetings, bulletin board notices, brochures and handouts, promotional pencils and notepads, and company newsletter articles written by the On-Site Coordinator and Project Director.

Over 300 associates took the assessment

Goal #2 *A minimum of 100 hourly employees and 25 salaried employees will enroll in and successfully complete ten weeks of instruction.*

168 associates signed up for training

137 total or 83 hourly and 54 salaried (supervisory) associates successfully completed the training

Goal #3 *All (100%) of the participants who successfully complete ten weeks of instruction will retain employment or be promoted.*

All retained employment except 5

Of those who completed training:

1 employee took another position

4 employees were terminated: 3 for attendance and 1 for falsifying company records

Total:

Of those who completed training, 5 (7.8%) terminated

Of those who did not take training, 11 (8.3%) terminated

New positions:

4 associates upgraded positions

1 associate was promoted to a salaried position

Goal #4 *All (100%) of the participants who successfully complete ten weeks of instruction will show gains in productivity, reduced material waste, reduced absenteeism, and reduced accident reports.*

***** One third of all frontline and half of supervisory employees were surveyed. Due to the sale of the company and downsizing, additional associates could not be surveyed. For example, positions were redesigned and some of the previous supervisors were no longer employed.

Productivity:

Management tracked by reviewing the number of warnings given for "job performance" and "not following directions."

A decrease in the number of warnings issued occurred over the last 3 years.

a. Of those who took training: 1992: 7 warnings; 1993: 5 warnings; 1994(first 4 months) = 0

Represents a 28.6% improvement from 1992-93 and a 100% improvement for 1993-94.

b. Of those who did not participate in training:

1992 = 23 warnings; 1993 = 19 warnings; 1994 (first 4 months) = 3

Represents a 17.2% improvement form 1992-93 and a 84% improvement from 1993-94.

Gains in productivity: supervisor ratings of post-program participants indicate 75% of program participants remained the same (i.e. were already functioning at high levels of productivity) and 25% increased somewhat. Supervisor ratings on the impact of training on their department said that 69% remained the same and 31% increased somewhat.

Reduced material waste:

Circumstances preclude the inclusion of this data at this time.

Reduced absenteeism:

Attendance is tracked by management by reviewing absenteeism and tardiness.

Comparing two 6-month time periods, July through December of 1993 to January through July of 1994, attendance increased 14 days, or 9.5% for those who took training.

Comparing the attendance rate for those who did not take training for the same two 6-month periods, attendance decreased 13 days, or 3.4%

Tardiness:

Comparing the same two 6-month time periods of July through December, 1993, to January through July, 1994, for those who took training, there was a decrease of 7 occurrences or 20%

Comparing the same two 6-month time periods for those who did not take training, there was a decrease of 13 occurrences, or 13%

Absenteeism, Associate self-reports:

Employee self-reports indicate associates felt their attendance improved somewhat (8%) or greatly (8%)

Other areas evaluated:

Perhaps the biggest impact on the associates who participated in the Diamonite 2000 training was on attitude. Employee self-reports indicate a 35% positive change in how they perceive their work as a direct result of the training;

62% indicate they perform very high or high quality

81% of those surveyed felt that they had improved their attitude on the job.

Supervisor department impact surveys on frontline associates indicate:

81% improved in their attitude on the job

77% were more confident on the job as a result of the training

46% felt their amount of work produced increased somewhat

50% felt they work independently on their job skill level
as opposed to needing supervision

Supervisors who participated in training report:

59% of the supervisors surveyed indicated a change in their job as a result of participating in training

63% reported high or very high quality in performance on the job

74% report improved attitude on the job

74% report enhanced confidence on the job

71% report increase in work produced

67% report ability to work independently or with less supervision

15% report improved attendance

Goal #5 *All (100%) of the participants who successfully complete ten weeks of instruction will show gains in supervisor's evaluations of communication and literacy skills.*

Supervisors indicated the following:

59% associates could handle new equipment or skill requirements better

66% of the associates who participated in training improved in their communication skills

69% improved in their abilities to work as a team member

STATISTICAL DATA ON LEARNERS SERVED

Assessment instruments were administered in three areas: mathematics, reading comprehension and written expression.

The results of the assessments which established baseline data are attached. For each instructional component, pre- and post-tests were administered. The results of those assessments are attached. Reading and writing instruction was combined for a holistic language approach.

DIAMONITE 2000
MATHEMATICS INSTRUCTION SUMMARY

Prior to the Diamonite 2000 program beginning, all hourly and salaried associates of Diamonite were given an assessment test to determine their level of basic mathematics skills. From this instrument, testers were classified into one of three levels: Independent, Target, or Frustration. See Table A for a summary of these results.

TABLE A

	% CORRECT	RAW SCORE	SALARY	HOURLY	TOTAL
INDEPENDENT LEVEL 68 TESTERS	90 - 100%	33,34,35,36	18	7	25
	80 - 90%	29,30,31,32	16	27	43
TARGET LEVEL 137 TESTERS	70 - 80%	26,27,28	6	20	26
	60 - 70%	22,23,24,25	5	29	34
	59 - 60%	18,19,20,21	7	40	47
	40 - 50%	15,16,17	2	28	30
FRUSTRATION LEVEL 73 TESTERS	30 - 40%	11,12,13,14	4	30	34
	20 - 30%	8, 9, 10	1	21	22
	10 - 20%	4, 5, 6, 7	0	16	16
	0 - 10%	0, 1, 2, 3	0	1	1
TOTAL*			59	219	278

* ONE TEST WITH NO NAME - NOT INCLUDED IN ANY STATISTICS

TOTAL TESTERS TESTING AT:		HOURLY	SALARY	ALL
INDEPENDENT LEVEL	(80 - 100%)	34	34	68
TARGET LEVEL	(40 - 80%)	20	117	137
FRUSTRATION LEVEL	(0 - 40%)	5	68	73
TOTAL TESTERS		59	219	278

SUMMARY OF CLASSES FOR HOURLY ASSOCIATES

During the Diamonite 2000 program of instruction for hourly associates, nine classes were held with a total enrollment of 88 participants. As part of these classes, the participants received five days (ten hours) of instruction in basic mathematics. Prior to the beginning of the mathematics instruction, the participants completed a 15-item pretest over the subject matter to be presented during instruction. After the mathematics instruction, the participants completed a post test that duplicated the pretest in order to determine the effectiveness of the instruction. Table B summarizes the results of these two tests. Statistics that appear in this table are based only on those students who took the assessment test, the pretest, and the post test.

TABLE B

DIAMONITE 2000 SUMMARY OF HOURLY EMPLOYEE PARTICIPANTS

LEVEL	NUMBER* OF PARTICIPANTS	AVERAGE PRETEST SCORE (OUT OF 15)	AVERAGE POST TEST SCORE (OUT OF 15)	MEAN INCREASE IN SCORE	MEDIAN INCREASE IN SCORE
INDEPENDENT	19 (17)	10.53 (70%)	13.47 (90%)	2.94 (20%)	3.00 (20%)
TARGET	49 (49)	6.86 (46%)	11.29 (75%)	4.43 (30%)	4.00 (27%)
FRUSTRATION	20 (16)	5.63 (38%)	9.69 (65%)	4.06 (27%)	3.00 (20%)
TOTAL	88 (82)	7.38 (49%)	11.43 (76 %)	4.05 (27%)	4.00 (27%)

* The total number of participants is followed in parenthesis by the number of scores used in calculating statistics (due to missing pretest, post test or assessment test).

SUMMARY OF CLASSES FOR SALARIED ASSOCIATES

During the Diamonite 2000 program of instruction for salaried associates, four classes were held with a total enrollment of 55 participants. As part of these classes, the participants received 3½ days (seven hours) of instruction in basic mathematics. Although the topics covered were the same as in the Hourly Class, the study of these topics started at a higher level, and proceeded further than in the Hourly Class. Prior to the beginning of the mathematics instruction, the participants completed a 15-item pretest over the subject matter to be presented during instruction. After the mathematics instruction, the participants completed a post test that duplicated the pretest in order to determine the effectiveness of the instruction. Table C summarizes the results of these two tests. Statistics that appear in this table are based only on those students who took the assessment test, the pretest, and the post test.

TABLE C

DIAMONITE 2000 SUMMARY OF SALARIED EMPLOYEE PARTICIPANTS

LEVEL	NUMBER* OF PARTICIPANTS	AVERAGE PRETEST SCORE (OUT OF 15)	AVERAGE POST TEST SCORE (OUT OF 15)	MEAN INCREASE IN SCORE	MEDIAN INCREASE IN SCORE
INDEPENDENT	33 (28)	10.21 (68%)	12.46 (83%)	2.25 (15%)	2.00 (13%)
TARGET	17 (15)	5.53 (37%)	10.40 (69%)	4.87 (32%)	4.00 (27%)
FRUSTRATION	5 (3)	3.33 (22%)	8.33 (56%)	5.00 (33%)	6.00 (40%)
TOTAL	55 (46)	8.24 (55%)	11.52 (77%)	3.28 (22%)	3.00 (20%)

* The total number of participants is followed in parenthesis by the number of scores used in calculating statistics (due to missing pretest, post test or assessment test).

DIAMONITE 2000

WRITTEN EXPRESSION BASELINE ASSESSMENT SUMMARY

	NUMBER OF TESTERS	AVERAGE	NO SCORES
SALARY - MALE	41	2.29	1
SALARY - FEMALE	20	2.30	- - - - - -
SALARY - TOTAL	61	2.29	1
HOURLY - MALE	95	1.36	7
HOURLY - FEMALE	130	1.51	3
HOURLY - TOTAL	225	1.44	10
GRAND TOTAL	286	11.19	11

* ANONYMITY OR NO NAME RESPONDENTS NOT INCLUDED IN TOTAL.

TOTAL TESTERS TESTING AT:

	SALARY	HOURLY
INDEPENDENT LEVEL	**30 (50%)**	**12 (6%)**
TARGET LEVEL	**20 (33%)**	**86 (40%)**
FRUSTRATION LEVEL	**10 (17%)**	**117 (54%)**
NO NAME OR SCORE	**1**	**10**
TOTAL	**61**	**225**

DIAMONITE 2000

READING BASELINE ASSESSMENT
Degrees of Reading Power (DPR)

	NUMBER OF TESTERS		DRP UNITS
SALARY - MALE	37		71.9
SALARY - FEMALE	21		70.8
SALARY - TOTAL	58		71.5
HOURLY - MALE	89		63.7
HOURLY - FEMALE	128		63.9
HOURLY - TOTAL	217		63.8
GRAND TOTAL	275		67.7

* THREE TESTS (ANONYMITY OR NO NAME) NOT INCLUDED IN ANY STATISTICS.

TOTAL TESTERS TESTING AT:

	SALARY	HOURLY	TOTAL
INDEPENDENT LEVEL	40	86	126
INSTRUCTIONAL LEVEL	12	60	72
FRUSTRATION LEVEL	6	71	77
TOTAL TESTERS	58	217	275

PRETEST - OVERALL PERFORMANCE OF BOTH GROUPS

	THINKING	STRESS MANAGEMENT	LISTENING	READING	RELATING
Independent	26%	24%	49%	27%	33%
Target	69%	67%	48%	71%	52%
Frustration	5%	9%	3%	2%	15%

PRETEST - BY GROUPINGS

	THINKING		STRESS MANAGEMENT		LISTENING		READING		RELATING	
	Salary	Hourly	Salary	Hourly	Salary	Hourly	Salary	Hourly	Salary	Hourly
Independent	24%	28%	20%	26%	48%	49%	29%	26%	45%	25%
Target	71%	68%	65%	69%	52%	46%	67%	74%	47%	55%
Frustration	5%	4%	15%	5%	0%	5%	4%	0%	8%	20%

PRETEST-THINKING

	% CORRECT	SALARY	HOURLY	TOTAL
INDEPENDENT LEVEL 35 TESTERS	91-100%	12	23	35
	81-90%	0	0	0
TARGET LEVEL 92 TESTERS	71-80%	23	47	70
	61-70%	0	0	0
	51-60%	0	0	0
	41-50%	13	9	22
FRUSTRATION LEVEL 6 TESTERS	31-40%	0	0	0
	21-30%	3	3	6
	11-20%	0	0	0
	0-10%	0	0	0
TOTAL		51	82	133

PRETEST-STRESS

	% CORRECT	SALARY	HOURLY	TOTAL
INDEPENDENT LEVEL 31 TESTERS	91-100%	10	21	31
	81-90%	0	0	0
TARGET LEVEL 89 TESTERS	71-80%	23	33	56
	61-70%	0	0	0
	51-60%	10	23	33
	41-50%	0	0	0
FRUSTRATION LEVEL 12 TESTERS	31-40%	6	2	8
	21-30%	0	0	0
	11-20%	1	2	3
	0-10%	1	0	1
TOTAL		51	81	132

PRETEST-LISTEN

	% CORRECT	SALARY	HOURLY	TOTAL
INDEPENDENT LEVEL 65 TESTERS	91-100%	4	2	6
	81-90%	21	38	59
TARGET LEVEL 64 TESTERS	71-80%	0	0	0
	61-70%	23	31	54
	51-60%	0	0	0
	41-50%	4	6	10
FRUSTRATION LEVEL 4 TESTERS	31-40%	0	2	2
	21-30%	0	0	0
	11-20%	0	2	2
	0-10%	0	0	0
TOTAL		52	81	133

PRETEST-READ

	% CORRECT	SALARY	HOURLY	TOTAL
INDEPENDENT LEVEL 36 TESTERS	91-100%	15	21	36
	81-90%	0	0	0
TARGET LEVEL 94 TESTERS	71-80%	29	41	70
	61-70%	0	0	0
	51-60%	6	18	24
	41-50%	0	0	0
FRUSTRATION LEVEL 2 TESTERS	31-40%	2	0	2
	21-30%	0	0	0
	11-20%	0	0	0
	0-10%	0	0	0
TOTAL		52	80	132

PRETEST-RELATE

	% CORRECT	SALARY	HOURLY	TOTAL
INDEPENDENT LEVEL 42 TESTERS	91-100%	5	3	8
	81-90%	18	16	34
TARGET LEVEL 65 TESTERS	71-80%	0	0	0
	61-70%	17	23	40
	51-60%	0	0	0
	41-50%	7	18	25
FRUSTRATION LEVEL 20 TESTERS	31-40%	3	8	11
	21-30%	0	0	0
	11-20%	1	7	8
	0-10%	0	0	0
TOTAL		51	75	126

POST TEST - OVERALL PERFORMANCE OF BOTH GROUPS

	THINKING	STRESS MANAGEMENT	LISTENING	READING	RELATING
Independent	24%	30%	53%	42%	29%
Target	73%	67%	46%	57%	48%
Frustration	3%	3%	1%	1%	23%

POST TEST - BY GROUPINGS

	THINKING		STRESS MANAGEMENT		LISTENING		READING		RELATING	
	Salary	Hourly	Salary	Hourly	Salary	Hourly	Salary	Hourly	Salary	Hourly
Independent	28%	22%	15%	40%	59%	50%	31%	49%	34%	28%
Target	69%	77%	82%	57%	39%	50%	67%	51%	62%	43%
Frustration	3%	1%	3%	3%	2%	0%	2%	0%	4%	29%

POSTTEST-THINKING

	% CORRECT	SALARY	HOURLY	TOTAL
INDEPENDENT LEVEL 32 TESTERS	91-100%	15	17	32
	81-90%	0	0	0
TARGET LEVEL 96 TESTERS	71-80%	27	44	71
	61-70%	0	0	0
	51-60%	0	0	0
	41-50%	10	15	25
FRUSTRATION LEVEL 3 TESTERS	31-40%	0	0	0
	21-30%	2	1	3
	11-20%	0	0	0
	0-10%	0	0	0
TOTAL		54	77	131

POSTTEST-STRESS

	% CORRECT	SALARY	HOURLY	TOTAL
INDEPENDENT LEVEL 39 TESTERS	91-100%	8	31	39
	81-90%	0	0	0
TARGET LEVEL 88 TESTERS	71-80%	34	34	68
	61-70%	0	0	0
	51-60%	10	10	20
	41-50%	0	0	0
FRUSTRATION LEVEL 4 TESTERS	31-40%	2	2	4
	21-30%	0	0	0
	11-20%	0	0	0
	0-10%	0	0	0
TOTAL		54	77	131

POSTTEST-LISTEN

	% CORRECT	SALARY	HOURLY	TOTAL
INDEPENDENT LEVEL 70 TESTERS	91-100%	2	6	8
	81-90%	30	32	62
TARGET LEVEL 60 TESTERS	71-80%	0	0	0
	61-70%	16	31	47
	51-60%	0	0	0
	41-50%	5	8	13
FRUSTRATION LEVEL 1 TESTER	31-40%	1	0	1
	21-30%	0	0	0
	11-20%	0	0	0
	0-10%	0	0	0
TOTAL		54	77	131

POSTTEST-READ

	% CORRECT	SALARY	HOURLY	TOTAL
INDEPENDENT LEVEL 56 TESTERS	91-100%	17	39	56
	81-90%	0	0	0
TARGET LEVEL 77 TESTERS	71-80%	31	30	61
	61-70%	0	0	0
	51-60%	5	11	16
	41-50%	0	0	0
FRUSTRATION LEVEL 1 TESTER	31-40%	1	0	1
	21-30%	0	0	0
	11-20%	0	0	0
	0-10%	0	0	0
TOTAL		54	80	134

POSTTEST-RELATE

	% CORRECT	SALARY	HOURLY	TOTAL
INDEPENDENT LEVEL 32 TESTERS	91-100%	3	5	8
	81-90%	7	17	24
TARGET LEVEL 52 TESTERS	71-80%	0	0	0
	61-70%	13	20	33
	51-60%	0	0	0
	41-50%	5	14	19
FRUSTRATION LEVEL 25 TESTERS	31-40%	1	19	20
	21-30%	0	0	0
	11-20%	0	5	5
	0-10%	0	0	0
TOTAL		29	80	109

HOURLY - THINKING

LEVEL	NUMBER OF PARTICIPANTS	AVERAGE PRETEST PERCENT	AVERAGE POSTTEST PERCENT	MEAN INCREASE IN PERCENT	MEDIAN INCREASE IN PERCENT
INDEPENDENT	17(15)	80.00	100.00	20.00	25.00
TARGET	59(56)	78.13	68.75	- 9.38	0.00
FRUSTRATION	1(1)	25.00	25.00	0.00	0.00
TOTAL	77(72)	77.77	89.24	11.47	0.00

HOURLY - STRESS

LEVEL	NUMBER OF PARTICIPANTS	AVERAGE PRETEST PERCENT	AVERAGE POSTTEST PERCENT	MEAN INCREASE IN PERCENT	MEDIAN INCREASE IN PERCENT
INDEPENDENT	31(31)	86.45	100.00	13.55	20.00
TARGET	44(38)	68.42	75.26	6.84	10.00
FRUSTRATION	2(2)	50.00	40.00	-10.00	-10.00
TOTAL	77(71)	75.77	85.07	9.30	0.00

HOURLY - LISTEN

LEVEL	NUMBER OF PARTICIPANTS	AVERAGE PRETEST PERCENT	AVERAGE POSTTEST PERCENT	MEAN INCREASE IN PERCENT	MEDIAN INCREASE IN PERCENT
INDEPENDENT	38(36)	76.25	85.83	9.58	0.00
TARGET	39(35)	68.23	64.09	-4.14	0.00
FRUSTRATION	0(0)	-----	-----	-----	-----
TOTAL	77(71)	72.30	75.11	2.81	0.00

HOURLY - READ

LEVEL	NUMBER OF PARTICIPANTS	AVERAGE PRETEST PERCENT	AVERAGE POSTTEST PERCENT	MEAN INCREASE IN PERCENT	MEDIAN INCREASE IN PERCENT
INDEPENDENT	38(34)	82.94	100.00	17.06	20.00
TARGET	39(36)	80.00	74.44	- 5.56	0.00
FRUSTRATION	0(0)	-----	-----	-----	-----
TOTAL	77(70)	81.43	86.86	5.43	0.00

HOURLY - RELATE

LEVEL	NUMBER OF PARTICIPANTS	AVERAGE PRETEST PERCENT	AVERAGE POSTTEST PERCENT	MEAN INCREASE IN PERCENT	MEDIAN INCREASE IN PERCENT
INDEPENDENT	22(20)	69.15	87.25	18.10	8.00
TARGET	34(28)	65.64	59.11	- 6.53	0.00
FRUSTRATION	21(17)	40.47	31.00	- 9.47	-16.00
TOTAL	77(65)	60.14	60.42	.28	0.00

RECOMMENDATIONS

We have no recommendations concerning the administration of this grant. We do, however, hope that this program and the opportunities it offers to businesses and industry in the United States continue.

DISSEMINATION ACTIVITIES

Presentations about this project were made at:

Train Ohio's Workforce: Models of Excellence in Workforce Development, sponsored by the Ohio Bureau of Employment Services, sponsored by the Ohio Bureau of Employment Services in cooperation with the Ohio Chamber of Commerce, Ohio Manufacturers' Association and Ohio Department of Development

The Ohio Association for Developmental Education statewide conference: a preconference training session was held for practitioners.

The National Association for Developmental Education in Kansas City, Missouri titled Workplace Literacy: Meet the Experts, preconference training institute, invited presentation.

This training program won the 1994 Governor's Workforce Excellence Award.

The final project report, external evaluation report, and curriculum manual are being sent to each of the following:

Clearinghouse on Adult Education and Literacy
U.S. Department of Education
Washington, D.C.

ERIC Clearinghouse of Adult, Career and Vocational Education
Center on Education and Training for Employment
Columbus, OH

East Central Center of National Network for Curriculum
Coordination in Vocational and Technical Education
Springfield, IL

EVALUATION ACTIVITIES

Project evaluation activities included midpoint and final evaluation procedures. Both evaluation procedures were designed to provide information regarding the effectiveness of the training. Such information was obtained by surveying the participants at the midpoint of the 40-hour course and at the completion of the 40-hour course. Both written surveys and oral discussions were used.

The midpoint evaluation was a written survey. The responses indicated participant attendance, new topics learned, participants' impressions of the purpose for the course, course impact on participants' personal goals, overall ratings of the course and suggestions for change. A summary of the midpoint evaluation results can be found in the appendices.

At the completion of the 40-hour course, the ATI Director of Continuing Education met with each group for evaluation purposes. Training participants completed the evaluation form found in the appendixes. The final evaluation survey indicated participants' ratings of overall program, course content effectiveness and appropriateness, format of the course, and instructor performance. In addition to completing the evaluation form, participants had the opportunity to share their thoughts, concerns, and comments in a discussion with the Director of CE. Comments shared tended to echo the comments participants included on their written evaluations as well as those indicated at the midpoint evaluation.

A summary of the final evaluation responses can be found in the appendices. Clearly, those items which referred to course content were evaluated to be "Excellent" and "Good" at a significantly high percentage. The items which centered around adequate time to cover the subject and time for questions and discussion scored mostly in the "Good" and "Fair" categories. Participants' responses indicated an interest in more time for communications and problem solving, as well as for math. There was a consensus that even 40 hours of instruction only allowed participants to "tip the iceberg" when dealing with the subjects included in the Diamonite 2000 project.

APPENDICES

JOB KNOWLEDGE INVENTORY RESULTS
Hourly

LESSON: JOB REQUIREMENTS INVENTORY
CLASS: HOURLY
NUMBER TESTED: 68/76

1. Not recorded
2. Not recorded

3. **Rate your ability to adjust to changing job requirements.**
*** only 56 answered this question.**

a) very good	%	b) good	%	c) not too well	%	d) uncertain	%
12	22%	37	66%	5	9%	1	2%

4. **Rate your relationship with others in your work group.**

a) very good	%	b) good	%	c) not too well	%	d) uncertain	%
23	34%	41	60%	2	3%	2	3%

5. **Rate your abilities to adjust to different personality and attitudes of supervisors.**

a) very good	%	b) good	%	c) not too well	%	d) uncertain	%
13	19%	41	60%	13	19%	1	2%

6. **If initiative means doing things on your own, or with little direction, how do you rate yourself when it is needed?**

a) very good	%	b) good	%	c) not too well	%	d) uncertain	%
28	41%	40	59%				

7. **Do you think you work better with close supervision or without it?**

a) with	%	b) without	%	c) uncertain	%	d) no difference	%
2	3%	44	65%	6	9%	16	23%

8. **To what degree do you think personal judgment is important in your work?**

a) very much	%	b) quite a lot	%	c) some	%	d) very little	%
23	34	32	47%	11	16%	2	3%

9. **Do you look forward to opportunities to have variety, such as, different hours or changing schedules? * only 60 answered this question.**

a) a great deal	%	b) quite a lot	%	c) some	%	d) no difference	%
9	15%	9	15%	29	48%	13	22%

10. **What is the state of your overall health as far as you know ?**

a) very good	%	b) good	%	c) not too well	%	d) uncertain	%
18	26%	46	68%			4	6%

11. **Hand-eye coordination refers to the ability to quickly transfer into action what the eye sees. Rate yourself on this job requirement.**

a) very good	%	b) good	%	c) not too well	%	d) uncertain	%
28	41%	39	57%			1	2%

12. **To what degree is your energy level high enough for this job?**
*** only 59 answered questions 12 through 17**

a) very good	%	b) good	%	c) not too well	%	d) uncertain	%
21	46%	33	56%	1	2%	4	6%

13. **To what degree do you think your eye sight and hearing are altogether good enough in your work?**

a) very good	%	b) good	%	c) not too well	%	d) uncertain	%
27	46%	30	51%	2	3%		

14. **Would you rate your general working conditions:**

a) very good?	%	b) good?	%	c) undesirable?	%	d) uncertain	%
4	7%	43	73%	10	17%	2	3%

15. **Are safety measures:**

a) very safe?	%	b) good?	%	c) adequate?	%	d) don't know?	%
14	24%	36	61%	9	15%		

16. **Are pay rates according to the skills needed:**

a) very good?	%	b) good?	%	c) below average	%	d) don't know?	%
12	20%	29	49%	14	24%	4	7%

17. **Are working hours for all shifts:**

a)highly acceptable?	%	b)acceptable?	%	c)need improvement?	%	d)undecided	%
12	20%	35	59%	10	18%	2	3%

JOB KNOWLEDGE INVENTORY RESULTS
Salary

Lesson: Job Requirements Inventory
Class: Salary
Number tested: 45/60

1. Not recorded

2. Not recorded

3. Rate your ability to adjust to changing job requirements.

a) very good	%	b) good	%	c) not too well	%	d) uncertain	%
17	38%	26	58%	2	4%		

4. Rate your relationship with others in your work group.

a) very good	%	b) good	%	c) not too well	%	d) uncertain	%
20	44%	23	52%			2	4%

5. Rate your ability to adjust to different personalities and attitudes of supervisors.

a) very good	%	b) good	%	c) not too well	%	d) uncertain	%
7	16%	37	82%	1	2%		

6. If initiative means doing things on your own with little direction, how do you rate yourself when it is needed?

a) very good	%	b) good	%	c) not too well	%	d) uncertain	%
24	55%	17	38%	3	7%		

7. Do you think you work better with close supervision or without it?

a) with	%	b) without	%	c) uncertain	%	d) no difference	%
1	2%	36	80%	3	7%	5	11%

8. To what degree do you think personal judgement is important in your work?

a) very much	%	b) quite a lot	%	c) some	%	d) very little	%
21	47%	17	38%	7	15%		

9. Do you look forward to opportunities to have a variety such as different hours, or changing schedules?

a) a great deal	%	b) quite a lot	%	c) some	%	d) no difference	%
4	9%	7	38%	17	39%	16	36%

* 1 person wrote "No".

10. What is the state of your overall health as far as you know?

a) very good	%	b) good	%	c) not too much	%	d) uncertain	%
23	49%	23	51%				

11. Hand-eye coordination refers to the ability to quickly transfer into action what the eye sees. Rate yourself on this job requirement.

a) very good	**%**	**b) good**	**%**	**c) not too well**	**%**	**d) uncertain**	**%**
15	33%	29	65%	1	2%		

12. To what degree is your energy level high enough for this job?

a) very good	**%**	**b) good**	**%**	**c) not too well**	**%**	**d) uncertain**	**%**
20	43%	21	46%	1	2%	4	9%

* 1 person marked both C and D.

13. To what degree do your think sight and hearing are all together good enough in your work?

a) very good	**%**	**b) good**	**%**	**c) not too well**	**%**	**d) uncertain**	**%**
20	44%	23	51%			2	5%

14: Would you rate your general working conditions:

a) very good?	**%**	**b) good?**	**%**	**c) undesirable**	**%**	**d) uncertain**	**%**
9	20%	32	71%	1	2%	3	7%

15. Are safety measures:

a) very safe?	**%**	**b) good**	**%**	**c) adequate**	**%**	**d) don't know**	**%**
29	65%	14	31%	2	4%		

16. Are the pay rates according to skills needed:

a) very good?	**%**	**b) good?**	**%**	**c) below average?**	**%**	**d) don't know**	**%**
3	7%	28	65%	2	5%	10	23%

* 2 people did not answer this question.

17. Are working hours for all shifts:

a)highly acceptable?	**%**	**b) acceptable?**	**%**	**c) need improvement?**	**%**	**d)undecided**	
2	4%	30	67%	3	7%	10	22%

PRE-TRAINING SURVEY RESULTS
Hourly

LESSON: PARTICIPANT PRE-TRAINING SURVEY
CLASS: HOURLY
NUMBER TESTED: 84/88

1. Age group:

16-18	19-25	26-35	36-50	51-65	65+
	7	31	32	12	

2. Ethnic group:

White	Black	Indian	Hispanic	Other
82				2*

*one person did not answer

3. Gender:

Male	Female
24	60

6. How long with this company?

Less than 1 yr	1-2 years	3-5 years	6-10 years	More than 10 yrs
8	8	8	14	46

13. What kinds of job training have you had?

Vocational School
Carpentry/remodeling
Military
SPC at Diamonite
Red Cross First Aid
CPR
Blueprint Reading
Computer classes
Typing, Bookkeeping
Technical Writing
Into. to Supervising
Human Resource
On-the-job training
Airline School
Cosmetology
Geometric Tolerencing class
CNC programming
Millwright School
Police/Jail training

Ohio EMT-A and Fire fighter
Statistical Control School
Micrometer Training
Patient Care Specialist
Water safety Instructor
Auto CADD
MIC/Caliper
Advanced Blueprint
ASQC class
Machine Trades (WCJVS)
Industrial Electricity
Mechanical Maintenance
Statistical Press Control Training
Registered Nurse
Welding Process
Inspection Procedures
Shrinkage
Pharmacy Tech.
Wheel and Track mechanics

14. What is the highest grade you completed?

9th gr.	10th gr.	11th gr.	12th gr	GED	1 yr college	more than 1 yr college
1	4	4	56	11*	10	7

* several people marked grade level and GED

15. Have you earned any college degrees?

YES 1* NO 80** * The one degree held was a Bachelors Degree
** Three did not answer

16. Which of the following are your reasons for attending this training?

57 a. To improve my future performance.
41 b. To qualify for future job postings
7 c. To gain experience with test taking skills.
44 d. To further my education.
38 e. To meet personal goals.
17 f. To find out more about this training.
15 g. To become more active in company training programs.
8 h. Other: Reasons given; "To improve skills", "To share what I know with others", "Hopefully company looks at this as a plus", and "refresh my memory"

17. Which way do you BEST like to get information about something you need to know more about?

15 a. Read about it.
3 b. Listen to a presentation or talk about it.
60 c. Have someone show and tell you about it.
4 d. Other. Wrote, "combination", "find out for myself"

18. Did you choose to take this training?

79 YES
1 NO

19. What did you expect to get from this training?

Improve myself
Improve math and "people" skills
Better knowledge of job
To have more stability in job performance
More money
Interact better with co-workers
Do job more efficiently
Problem solving
Job experience
Greater insight into way I think
Help with job stress
Make me a better employee
More confidence and knowledge
Make future education easier
Learn new ideas
Job security
Help Diamonite to become more competitive in the job market through employee training
"Doesn't matter what I learn. If I learn anything, I've gained!"

PRE-TRAINING SURVEY RESULTS
Salary

Lesson: Participant Pre-training Survey
Class: Salary
Number tested: 51/60

1. **Age group:**

16-18	19-25	26-35	36-50	51-65	65+
	1	15	22	12	1

2. **Ethnic group:**

White	Black	Indian	Hispanic	Other
49	1	0	0	1

3. **Gender:**

Male	Female
30	21

6. **How long with this company?**

Less than 1 yr	1-2 years	3-5 years	6-10 years	more than 10 years
1	5	6	14	25

13. **What kinds of job training have you had ?**

High School Office Courses(typing, shorthand, bookkeeping, etc.)
College Classes:
    Business Communications, OSU/ATI
    Design of Experiment, OSU/ATI
    Injection Mold course, OSU/ATI
    Writing course, OSU/ATI
    Ceramic Engineering, OSU (B.S.)
    Accounting classes(2 yrs. at business college)
Various Management Training courses
SPC Training at Diamonite(7)
Seminars:
    Successful Customer Relations
    Power Communications Skills
    Professional Telephone Skills
    Sales Training Project Management
    Business Reporting
Secretarial and Human Resources
Kiln Control
Supervisor Training
On-the-job training

(Training continued)

Military training
Blueprint Reading
Managing Account Potential
Synchronized Manufacturing
How to Deal with People
Grace Management Course
Accounting for Non-accountants
CPM certification
Sales
Time Management
Medical and Surgical Technology
Sync Flow
Military Police AIT and Sentry Dog Training

14. What is the highest grade you completed?

______	31	4	27
Below 11th	12th grade	1 yr college	More than 1 yr.

15. Have you earned any college degrees?

22	23*
Yes	No

11**	13	4
Associates	Bachelors	Masters

* One person is expected to receive a degree in '95
** One person expecting to receive degree in spring '94

16. Which of the following are your reasons for attending this training?

35 a. To improve my job performance.
6 b. To qualify for future job postings.
2 c. To gain skills with test taking skills.
17 d. To further my education.
20 e. To meet personal goals.
13 f. To find out more about this training.
8 g. To become more active in company training programs.
17 h. Other (reasons given; "Mandatory" and "To learn methods to help meet company goals")

17. Which way do you BEST like to get information about something you need to know more about?

22 a. Read about it.
3 b. Listen to a presentation, or talk, about it.
26 c. Have someone show and tel you about it.
1 d. Other (wrote "All of the above")

18. Did you choose to take this training?

18	30
Yes	No

19. What did you expect to get from this training?

Learn to be more of a team player
Further my knowledge
Hoped to see improved communications and teamwork company wide
A better working relationship with others at Diamonite
More self-confidence
Enhanced writing skills
Skills dealing with stress reduction
Learn to communicate more effectively
New ideas about learning, teaching & interacting w/ other employees
Better understanding of others' points of view
Understanding the training program so I can help others
Report writing skills
Improve troubleshooting skills
Learn to present materials
Improve math skills

Lesson: Midpoint Evaluation
Class: Hourly
Number tested: 71/76
Date tested:

1. How many classes have you attended so far? Out of __ possible.

47 - Attended all classes
14 - Missed one class
4 - Missed two classes
2 - Missed three classes

2. What topics/areas have you learned about that you did not know about before taking this class?

35 - Math (geometry, fractions, percentages)
18 - Stress (management)
13 - Listening (skills)
3 - Did not answer
3 - Communication, different ways to get point of view across, art of listening, how to state your views
3 - Communication (skills)
2 - Reading
2 - Ways to learn, thinking to learn
2 - Learning modalities
- Some areas in math
- Mic. reading
- Working toward goals
- Different ways of learning
- Finding facts in statements
- Writing and how to put to use what you read and learn
- Thinking
- Reading micrometers
- Setting goals and keeping with it
- Communicating
- Goal setting skills
- To learn how I think

- Missing sleep
- Thinking to learn
- Gauges
- Reading comprehension
- Learning about goals
- Differences in listening and hearing
- Brainstorming
- Locating information
- Refreshed memory
- Showed areas I need to work on
- Self esteem with math

3. What is the purpose of this course?

19 - Improve job performance/ job improvement
16 - Help me communicate with others (more easily and effectively)
15 - Improve myself (better education)
12 - Refresh math skills
7 - Improve skills, better prepare us for the work force of today and tomorrow
3 - Improve skills on the job in math and communication
3 - Dealing with others/work better together
2 - To teach or refresh in the basics related to function better in workplace and personal relations
3 - Improve reading and writing skills
2 - Better listening skills
2 - Make a better person all-around
2 - Make this a better place to work
2 - Improving my learning and thinking abilities
2 - Create positive thinking/better attitude
2 - Understand job better
2 - Learn about ourselves

- Improve workplace
- Teach one how to think
- Learn to explain problems in more detail
- Communicate better to and with others at work, to have less problems, ending up with less stress, and a better place to work
- To have some organizational skills

- To get better in the area of which you work
- To look for facts
- Aim toward goal and be best I can be
- Mental input
- Develop problem solving skills
- To be open to new ideas and areas
- To be aware of surroundings
- To prepare employees for future changes at Diamonite
- Gain knowledge and do job better
- Build trust
- Working to solve problems in workplace
- Understand ourselves and how we react to things
- Attitude improvement
- Get more knowledge
- Refresh skills
- Stress management
- Learn to work with people
- How to use knowledge to find out instead of guess
- Better ways of learning
- To help employees
- Become better at listening, math skills, and communicating

4. Has the class helped you work toward any of your personal goals such as attitude/self esteem?

_57_ Yes _13_ No If you answered yes, in what way has the class helped?

4 - Ability to communicate with another
2 - Helped to view things differently
2 - Feel more self-confident
2 - Has improved my self-esteem (because I learned and mastered something new)
2 - Able to cope better, better attitude
- Helped me look at personal goals in a different way, to help achieve goals
- Motivated me to start working towards my goals and helped me set them
- Pushes me toward goals by writing them down
- To clarify routes toward goals
- Helping me approach my goals step by step

- Controlling binge eating by setting realistic goals
- Able to bid on different job (confidence boost)
- Self-esteem, because I always wanted more education
- Be more honest with myself, give myself more credit
- I'm smarter than what I give myself credit for
- More self-esteem, willing to take harder job
- Self-esteem
- Feel more able to do job more competently
- Feel better about self and ability/capacity to learn
- Even at my age I can concentrate on learning and improve my skills
- Somewhat, it has shown me I may not be as stupid as I look, then again maybe I am
- Realized I'm good at something (recognized strengths and weaknesses)
- To be encouraged to think (self-esteem)
- More positive outlook
- Better attitude
- Attitude about others (listen to what they have to say)
- Problem solving with the workplace, gave me more knowledge that makes me feel better and better attitude
- Dealing with stress
- Has helped to control stress better
- Need to learn more on controlling stress
- Math skills
- Refresh some math skills
- Know how to read mics, better knowledge of math
- Understand situations and communication skills
- Communication skills
- Communication is a two-way system, must be listening going on to truly communicate with others
- Help me work out problems with others, listening and teamwork
- Trying to be more assertive
- Learn to listen at home and work
- Understanding one's self
- Asking questions, for things repeated
- Satisfaction in learning new things
- Plan to continue my education
- Showed areas to improve in
- Stopped smoking for one week, weight lifting on a regular basis, and manage time better

- Refresh skills
- Thinking things out
- Made me more aware of my occasional inattention
- Better understand other people and to not take things on the defensive
- Helps me to be more considerate of other people I work around
- More confident to try things without a lot of help
- To understand the way things work
- How to present questions without intimidating or offending others
- How to receive information constructively
- Time to think about what I need
- Materials to look back on when needed

5. Have you made every effort to participate and keep an open mind about this course?

_____71______ Yes ____________ No

6. Circle one number in each row to show how you would rate each item.
HOW WOULD YOU RATE THIS PROGRAM?

	positive		neutral	negative		
Very interesting to me	5(37)	4(28)	3(5)	2(1)	1	Boring to me
Very useful on the job	5(18)	4(28)	3(21)	2(4)	1	Totally useless on the job
Much too difficult	5(1)	4(8)	3(45)	2(14)	1(3)	Much too easy
Very useful outside work	5(13)	4(25)	3(28)	2(4)	1(1)	Totally useless outside of work
Exactly what expected	5(5)	4(22)	3(30)	2(9)	1(3)	Not what I expected

* one student answered "no expectations"

HOW WOULD YOU RATE THE MATERIALS?

Hard to learn, confusing 5**(4)** 4**(8)** 3**(30)** 2**(13)** 1**(14)** Easy & simple

*two students did not answer

7. Would you recommend this course to a co-worker or friend?

_____70_____ Yes ______1______ No

8. If you could change anything about this program, what would it be?

7 - More time on math, go slower on it (include trig. and use scientific calculator)
6 - Slower pace
6 - Make it longer (two weeks for each subject) I could not take it all in in the short time we had/ Longer classes, extended
5 - More (depth with) math
5 - More time on some subjects/ last longer
3 - Nothing
- Writing takes too much time, do things totally in class
- Mix salary and hourly in classes
- Chance to interact with salaried people without retribution
- Organization of material
- Have classes for family members
- Have more classes on whatever
- The hours
- Class at different time for 3rd shift (before not after work)
- More about communication in the workplace
- Work with measuring equipment used on job
- Have more blueprint reading in class
- More micrometers, etc.
- Teach more on time cards for new people
- More on controlling stress
- Coping with stress
- Consumer information, buying and budgeting

- Relating to people with bad attitudes, and dealing with them
- More about dealing with others and relating to life situations. How to deal with emotional problems other than stress.
- Goes a little fast, but we can always look back in notebook
- Not have 1000 word essay at end
- Ability group people to make class more comfortable and help instructors
- Encourage students to continue learning by discussing possible classes available at area institutions for areas covered in program i.e.reading, writing, math

Lesson: Midpoint Evaluation
Class: Salary
Number tested: 26/34
Date tested:

1. How many classes have you attended so far? Out of __ possible.

11 - Attended all classes
2 - Missed one class
6 - Missed two classes
4 - Missed three classes
1 - Missed four classes
1 - Missed five classes
1 - Missed eight classes

2. What topics/areas have you learned about that you did not know about before taking this class?

9 - Math (geometry)
3 - Learning modalities
2 - Stress
2 - Did not answer
- Improving listening
- Different types of listening
- Different levels of reading
- Statistics review
- Intent>impact
- Communication skills
- Working and communicating better with others
- More in-depth topics
- How to handle stress
- Relating at work
- Good review

3. What is the purpose of this course?

4 - Improve communication skills
3 - Work with co-workers better
3 - Self-improvement
3 - No answer
2 - Get me to think
2 - Understand jobs/others better
2 - Mandatory
2 - Better communication throughout the work area
2 - Help us more on the job
- To help Diamonite be more competitive in the market place by empowering employees to work smarter and more synergistically
- Let us know what hourly are learning
- Math review
- Build teamwork strategy (which hasn't happened yet)
- Promote teamwork
- Be better team worker and learn to be more effective
- Work as an effective team for Diamonite
- Make ourselves understood
- Mental exercise
- Expose us to new ideas
- Brush up on education and follow training guidelines
- Help insure minimum competency level of work-related skills which pertain Diamonite
- To refresh and enhance your knowledge in areas of communication, math, and interpersonal relationships
- Enhance our skills

4. Has the class helped you work toward any of your personal goals such as attitude/self esteem?

_14_ Yes _12_ No If you answered yes, in what way has the class helped?

3 - More confident in math/math review
- Communication
- Listening to what people are saying instead of attitude (or tone) they use to say it

- Learn to listen better and comprehend what you read
- I get a rush when I speak up in class and know an answer nobody else does!
- Get me back to school
- Working better with others
- Learn about self and way I learn
- Assertiveness training could be useful
- Trying to understand relationships with others
- Make me think before I act
- Feel more tolerant
- Set up personal goals

5. Have you made every effort to participate and keep an open mind about this course?

_____25______ Yes ______1______ No

6. Circle one number in each row to show how you would rate each item.
HOW WOULD YOU RATE THIS PROGRAM?

	positive		neutral	negative		
Very interesting to me	5(4)	4(9)	3(11)	2(1)	1	Boring to me
Very useful on the job	5(1)	4(12)	3(9)	2(2)	1(1)	Totally useless on the job
Much too difficult	5	4	3(11)	2(8)	1(6)	Much too easy
Very useful outside work	5(1)	4(6)	3(14)	2(4)	1	Totally useless outside of work
Exactly what expected	5	4(9)	3(12)	2(3)	1(1)	Not what I expected

HOW WOULD YOU RATE THE MATERIALS?

Hard to learn, confusing 5 4(1) 3(10) 2(5) 1(8) Easy & simple
* two students did not answer

7. Would you recommend this course to a co-worker or friend?

____24____ Yes ____1____ No * one student wrote "neutral"

8. If you could change anything about this program, what would it be?

7 - Did not answer
2 - More time for math
2 - Change math to target needs
- Different levels of math
- More challenging math (Calc. story problems and applications; teach DOE (Design of Experiment))
- More things pertaining to our jobs
- More advanced subjects for those who have advanced degrees
- Salaried skill levels should be broken into separate groups
- Make two sessions according to experience with subjects
- Not so much jumping around from one subject to next and back again
- Make it longer to cover material better
- More time for open discussion with class
- The timing (would like it after work)
- Adapt format of training to one specifically for the Body Shed Dept.

DIAMONITE 2000
PROGRAM EVALUATION

2000 DIAMONITE
THE OHIO STATE UNIVERSITY
Agricultural
Technical
Institute

Please help us in maintaining and improving OSU/ATI's Continuing Education Programs by completing this form.

Please check the proper column:

	Excellent	Good	Fair	Poor
1. Overall Program rating	___	___	___	___
2. Course content				
a. The course expanded my knowledge of the subject	___	___	___	___
b. The course was interesting and informative	___	___	___	___
c. The course met my expectations	___	___	___	___
d. The program was valuable for my needs	___	___	___	___
e. Handouts were effective	___	___	___	___
f. The material presented was practical and useful for application	___	___	___	___
3. Format and Facility				
a. Adequate time was allotted to cover subject	___	___	___	___
b. Adequate time was allotted for questions and answers	___	___	___	___
c. Rate the adequacy of the facility and room(s) (comfort, ventilation, acoustics, temperature)	___	___	___	___
4. Instructor's performance-Jean Opliger				
a. Ability to present material clearly	___	___	___	___
b. Presentation style	___	___	___	___
c. Knowledge of subject	___	___	___	___
d. Flexibility in adjusting course to student needs	___	___	___	___
e. Effectiveness of visual aids (flip charts, films, etc.)	___	___	___	___

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5. Instructor's performance-Emil Miller

a. Ability to present material clearly	___	___	___	___
b. Presentation style	___	___	___	___
c. Knowledge of subject	___	___	___	___
d. Flexibility in adjusting course to student needs	___	___	___	___
e. Effectiveness of visual aids (flip charts, films, etc.)	___	___	___	___

6. Instructor's performance-George Kreps

a. Ability to present material clearly	___	___	___	___
b. Presentation style	___	___	___	___
c. Knowledge of subject	___	___	___	___
d. Flexibility in adjusting course to student needs	___	___	___	___
e. Effectiveness of visual aids (flip charts, films, etc.)	___	___	___	___

7. Would you recommend this course to others?

1. Yes ___

2. No ___ (If not, please explain your reasons in Number 6.)

8. Please indicate additional comments. We are particularly interested in how the course and instructor did or did not meet your expectations. What recommendations would you make if the course were to be given again?

____

____

____

9. What additional knowledge/skills are you interested in acquiring in the next continuing education program you attend? In what other areas can we provide similar programs?

____

____

____

10. May we use your comments in our promotional material?

___ Yes ___ No Signature (optional)_______________________________

DATE________

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CONTINUING EDUCATION

PROGRAM EVALUATION

Please help us in maintaining and improving OSU/ATI's Continuing Education Programs by completing this form.

Please check the proper column:

	Excellent	Good	Fair	Poor
1. Overall Program rating	41.7%	55.3%	2.8%	
2. Course content				
a. The course expanded my knowledge of the subject	30.2%	62.6%	6.5%	.7%
b. The course was interesting and informative	46.4%	47.9%	5%	.7%
c. The course met my expectations	23.1%	58.9%	17.9%	
d. The program was valuable for my needs	27.9%	52.9%	18.3%	.7%
e. Handouts were effective	34.2%	60%	5.7%	
f. The material presented was practical and useful for application	35.2%	55.8%	8%	.7%
3. Format and Facility				
a. Adequate time was allotted to cover subject	1.4%	39.1%	47.8%	11.5%
b. Adequate time was allotted for questions and answers	18.2%	54%	25.5%	2.2%

4. Please indicate additional comments. We are particularly interested in how the course and instructor did or did not meet your expectations. What recommendations would you make if the course were to be given again?

I was really impressed with instructors and their teaching skills. I feel that there wasn't enough time allotted for the amount of material to be covered.

Give more time for the last part-teams. Was didn't have enough time to go through all the material we were given.

My expectations were exceeded. A lot of material was presented that taught me something. More time should be spent training all employees.

I felt that Emil & Jean were very good informing the classes however Mr. Kreps seemed to talk at you not to you and his homework level was very extremely high. I felt he knew his job but would recommend he gives more in class time for group projects. Also less homework.

My main concern with the program is that we didn't get deep enough into the subjects...this is probably because I'm considering college and I like complete understanding.

Time to cover subjects longer, a feeling of rush-rush was with me and caused some stress and hindered me from learning some days.

I wasn't able to connect with Mr. Kreps. Maybe because he had so much material to cover. We had a lot of homework. I think maybe we should have more class days.

I would recommend that the last section on teamwork be allotted more time. There is so much material to absorb it requires more in depth coverage.

A little more time is needed, especially for the last session. The instructor was good in what he was doing but it was a little out for me. His presentation could have been a little more explanatory and easier instructions.

I liked the courses very much. Each teacher was very good. My favorite teacher was Jean Opliger. She was loud and clear. I have a little hearing problem. I think it was an excellent course and everyone in Diamonite should take the course.

The class overall view I thought was well presented.

More emphasis and detail on team building for me the whole 10 weeks would have better spent on team building; strategies, policies, and implementation.

More time given to complete group project /demands of work and home make it difficult to get group members together, especially around holidays.

Focus more on dealing with difficult people went into some, but more instruction would be helpful.

A longer time period for 1,000 word essay that was presented on the next to the last class.

More team building.

Maybe a summary of everything we learned (or a follow up) would be helpful to prevent forgetting most of it!

Always on time, didn't seem to waste time. Needed more time for amount of material covered. Parts 1 and 2 shorter, Part 3 (team building) longer. Team building should have more in class group projects.

A better job should be done to match course content to students needs. Some individual would benefit greatly from different courses. Others already have much of the "required knowledge"! Certainly teamwork is appropriate for all individuals even if currently practices, these skills constant vigilance is necessary.

We all suggested that a little longer time for the Team projects be given (although some will still wait for the last minute to do their work-Human Nature).

For some people the course was too elementary. Perhaps the course could be offered on two levels- those who have never had the formal instruction and an advanced course for those who have had formal instruction.

Offer more than one subject at one time so we can take something we need or have an interest in.

It is hard working 3rd shift and then coming to class.

I recommend that 3rd shift people come to afternoon classes.

It was better than I expected.

More time to each area - warmer area to learn in.

I thought all the instructors were good but Mr. Miller went to fast on some of the math.

Math could be more in depth, more time spent on teamwork.

I think it would help if the course it self was longer.

Maybe 3 hours or three more classes.

The instructors met my expectations they each made you feel important as a person.

I liked the course just the way it is.

Jean's and Georges classes were not long enough; needed more time to discuss and get more indepth.

More time; it met by far my expectations.

I would take a class with any one of the 3 teachers again.

Make the course longer.

More time!!! Better accomodations. Room in the pits! 3 C

It is hard working 3rd shift then coming to class- very hard to stay awake in some classes

Jean was really great, she got the point across and I understood her well.

Need more time for the classes - everything rushed.

I would recommend that it be given the same way.

I would like to see it be mandatory for all employees.

It needs to be made clearer about what they are doing here.

I heard that it was just upgrading basic skills.

Allow more time for the team problem solving and have more team oriented projects.

More time spent on one area of a subfict such as math.

The instructors were knowledgable and motivating.

Instructors were very helpful in explaining.

They treated us as individuals, down at our level.

They made everything understandable and told us why we do it.

A little less homework especially reading.

It was hard for me to find time working 10 hour days.

We need more emphasis on math.

For the classes to be longer.

The subjects were very interesting, but not enough time was allowed.

Have a refresher course for supervisors.

More videos (useful).
More instruction on having a team meeting would have been helpful.
Allow more class time for team projects.
George was a good teacher, but he needs to speak up.
I believe that George Kreps needs a little more time for his section.
It seemed he was crowded for time for all his material.
I really enjoyed the class as a whole.
It was informative and fun.
The instructors were friendly and took time to explain unclear material.
Warmer room.
I enjoyed the course all the way through.
Adding how to fill out time cards the right way.
The team building portion would be more effective if teams were given more time to get used to working as a team.
Our presentation time came sooner than we could effectively prepare for it.
I enjoyed the way all three teachers presented their areas of expertise.
I really enjoyed this course.
It was a lot more than I had expected.
For me, I am not a fast learner.
I require just a little more help to be able to understand things.
The class was a little fast for me, but was taught well over all.
I would suggest working with the company (because I realize that it is not entirely your fault) to allow the same amount of time to each class going through the course.
Over all the classes were very interesting and adaquate, but I wish we had more time to announce all information.
Went through too fast on some things with my busy work schedule.
I needed more time on using mics and measuring.
The instructors did a very good job in all of the subjects.
I think you may need to get a little more time for the group projects.
I think all of the instructors were very good.
I would like to have had more time.
We were rushed through the program as one of the last groups through the program.
You need to work better with the schedules of people working swing shift.
George needed more time to cover his material.
Allow more time for group projects.
Everyone did an excellent job at keeping my interest up in the three different subjects.
The only thing wrong was that the teamwork was rushed due to time restraints.
More time in math and communication.
Course was given doring holiday period.
Some of the materials canned and others given enough time.
Have course in better facility.
Do not drag it out for such a long period of time.
My understanding of the course was how to improve etc. communication.
Not enough on this subject as to how the other subject matter is connected to communication.
We seemed to skip around too much.
I would have liked going page by page.
Some assignments given were never talked about.
George's session could have moced a little quicker.
He got off of the subject easily.

5. What additional knowledge/skills are you interested in acquiring in the next continuing education program you attend? In what other areas can we provide similar programs?

I am looking for more classes which will further my knowledge on the jobs that I do.
I am not sure, I would take anything offered. I think we can all gain a little bit from any course myself, I think a memory course and more everyday math.
I would love to learn computers.
I would like to have other classes to help toward our education.

I would like to continue my math skills.
Just for the fun of it - writing and history.
Possible management training, definitely computer skills!!

Additional skills on work relationships and communications.
I would like to learn as much as possible about the company I work for so that I can be the best employee I can be and to further my career.
I feel that the last part of this course could be put into a separate class or at least allotted more time.
Knowledge of what we do at Diamonite for every day work methods.
"Diamonite 2001" a new series of training courses, using the topics covered in Diamonite 2000, taught by a mixture of ATI and Diamonite people, developed in a teamwork mode, designed to get to ACTUAL APPLICATION of concepts applied to real-life Diamonite processes and situations.
More time on team building and problem solving. Future classes could have hourly and salary together.
Additional teambuilding skills
Hands on engineering skills-hydraulics-electronics-CAD
I believe more time and focus could be spent on organizational behavior and the dynamics of groups, and team building skills.
Teams and team building, but I believe experience in implementing those concepts may be of more value then continuing education.
I would like to get more training in computers and possibly higher education in some math subjects.
Effective presentations (oral communication skills)
I would recommend computers.
Better understanding the basics of business; understanding managements views.
More self expression - to be able to relate to fellow workers.
More on teamwork, people skills.
A better blue-print reading class.
One that uses our parts and blue-prints.
Better oral communications and writing communications and teamwork with management - computer.
Advanced communications and computers.
Advanced communication and computers.
More of everything!
2 C - 3 A - 3 B, Composition.
Expand math.
Salaried and hourly classes together.
I would like for us to work more on building teams and better communication.
Blueprint reading.
Review of how this company is progressing.
Computer hexadecimal system creating computer macros configurations files and the complete teardown and functions of the computer.
Advanced computer training.
Understanding binary numbers.
Math.
We need more on measuring devices for new hires.
Computer skills.
Language.
Time management.
Speaking and writing.
Something to help build self confidence.
It's tore down so much here.
I would like to see more hourly people attending seminars and visiting customers.
We as hourly employees need information to do our job too.
Algebra.
Blueprint course.
Machine trade.
A couple more classes with Mr. Kreps.
He gave so much in handouts, but only got to go over a portion of the material.
Computer skill.
Higher math skills.
Extensive work in acquiring team skills.
More blueprint reading.
Advanced blueprint reading classes.
SPC chart classes.
More group projects.
Mix in the blueprint class into D-2000 on floor training with class work.
Computer classes.
More classes on working or dealing with other people.

Have management, supervisor and employee work a certain project together.
More communication between direct department and one on one learning.
Learning computers.
Blueprints.
SPC.
I would be more interested in subjects that we could put to practical use.
More on "team" sessions and what they can accomplish.

TRAINING PROGRAM

For office use only

Entry date: ________________

PARTICIPANT PRE-TRAINING SURVEY

Exit Date: __________

Occ. Code: __________

____

I. Personal Information

Social Security No. ________________ Dept. ____________

Name ____
(Last) (First) (Middle Initial)

Current Address: ____
(Street and Number)

____
(City) (State) (Zip Code) (County)

Telephone Number: ________________________ Birthdate: ________________
(Month) (Day) (Year)

1. What is your age group?

_____ 16-18 yrs. _____ 19-25 yrs. _____ 26-35 yrs. _____ 36-50 yrs. _____ 51-65 yrs. _____ 65+ yrs.

2. What is your ethnic group?

_____ White _____ Black _____ Indian _____ Hispanic _____ Other

3. What is your gender? _____ Male _____ Female

II. Employment Information:

4. Are you now employed? _____ Yes _____ No

5. What company do you work for? ________________________________

6. How long have you worked for this company?

_____ Less than 1 yr. _____ 1-2 yrs. _____ 3-5 yrs. _____ 6-10 yrs. _____ more than 10 yrs.

7. What is your job title? ________________________________

8. How long have you worked in this job title? ________________________
(Beginning Date)

9. What other jobs have you held with this company?

1. ______________________________ From: __________ To: __________

2. ______________________________ From: __________ To: __________

3. ______________________________ From: __________ To: __________

10. What other kinds of jobs have you held?

JOB TITLE	DATES	COMPANY

11. What kinds of machines, equipment, tools have you used on the job?

1. __________________________ 4. ______________________________

2. __________________________ 5. ______________________________

3. __________________________ 6. ______________________________

III. Training & Education Information:

12. Have you served in the military? 1. ______ Yes 2. ______ No

13. What kinds of job training have you had? (Please list below)

1. ____________________________________

2. ____________________________________

3. ____________________________________

4. ____________________________________

14. What is the last grade you completed in school?

______ below 8th ______ 8th ______ 9th ______ 10th ______ 11th ______ 12th

______ GED ______ 1 yr. college ______ more than 1 yr. college

15. Have you earned any college degrees?

1. ______ Yes 2. ______ No 3. ______ Associates 4. ______ Bachelors 5. ______ Masters

16. Which of the following are your reasons for attending this training? (You may mark up to three answers.)

______ a. To improve my job performance.

______ b. To qualify for future job postings.

______ c. To gain experience with test taking skills.

______ d. To further my education.

______ e. To meet personal goals.

______ f. To find out more about this training.

______ g. To become more active in company training programs.

______ h. Other ______________________________

17. Which way do you BEST like to get information about something you need to know more about? (Please mark only one answer.)

1. ______ Read about it.

2. ______ Listen to presentations or talks about it.

3. ______ Have someone show and tell you about it.

4. ______ Other (describe) ______________________________

18. Did you choose to take this training? 1. ______ Yes 2. ______ No

19. What do you expect to get from this training? ______________________________

____

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PATHWAY SKILLS
THINKING TO LEARN

Lesson 1

Competency Precheck

1. Thinking is:

   a. Organized
   b. Directed toward a goal
   c. The same as daydreaming
   d. a and b
   e. None of the above

2. A fact is:

   a. The same thing as an opinion
   b. Something that exists
   c. Very general
   d. None of the above
   e. All of the above

3. A goal is:

   a. An aim we strive to achieve
   b. Purposeful
   c. Discovered by asking the question "Why?"
   d. All of the above
   e. None of the above

4. Thinking to learn can be developed by:

   a. Asking questions
   b. Working toward goals
   c. Locating and understanding information
   d. Understanding people
   e. All of the above

Lesson 2

Competency Precheck

1. Stress is:

    a. Pressure
    b. A fight or flight reaction
    c. Unavoidable
    d. All of the above
    e. None of the above

2. Stress comes from:

    a. Outside the person
    b. Inside the person
    c. Both inside and outside the person
    d. All of the above
    e. None of the above

3. The difference between positive and negative stress is:

    a. Positive stress helps us concentrate and focus
    b. Negative stress can help us survive
    c. The body reacts differently to each kind of stress
    d. The body relaxes after negative stress
    e. All of the above

4. We can never eliminate stress from our lives

    a. True
    b. False

5. We can learn effective coping techniques

    a. True
    b. False

GATEWAY SKILLS

LISTENING AT WORK

Lesson 5

Competency Precheck

1. Listening and hearing are the same thing.

    a. True

    b. False

2. All people who speak English attach the same meaning to the works they use.

    a. True

    b. False

3. Feedback is not essential to understanding another person.

    a. True

    b. False

4. We spend most of our day talking at work.

    a. True

    b. False

5. The biggest problem with listening is that it is taken for granted.

   a. True

   b. False

6. You can think about 4 times as fast as you can listen.

   a. True

   b. False

GATEWAY SKILLS

READING ON THE JOB

Lesson 7

Competency Precheck

1. We read for a purpose such as:

   A. To be entertained

   B. To locate information

   C. To understand

   D. All of the above

   E. None of the above

2. Ideally we read to accomplish all of the above purposes.

   A. True

   B. False

3. Understanding what a writer says results in understanding.

   A. True

   B. False

4. It is possible to get information without understanding the writer's point.

   A. True

   B. False

5. Effective reading is passive.

   A. True

   B. False

MASTERY SKILLS

Competency Precheck

Relating at Work

1. **Our perceptions are information we receive from**
   - a. Our parents
   - b. Our friends
   - c. Ourself
   - d. Our senses
2. **Our attitudes are influenced by**
   - a. Our beliefs
   - b. Our feelings
   - c. Our behavior
   - d. All of the above
   - e. None of the above

3. Aggressive behavior is

   a. Never appropriate

   b. Seeking power

   c. Hostile and angry

   d. All of the above

   e. None of the above

4. Assertive people

   a. Are pushy

   b. State their rights

   c. Let others push them around

   d. Act like martyrs

5. Conflict is harmful

   a. True

   b. False

6. Conflict resolution means

   a. Someone wins

   b. Someone loses

   c. Both a and b

   d. None of the above

TAB INDEX

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Tab #2 Gateway Skills

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- Writing at Work
- Listening at Work
- Speaking at Work

Tab #3 Using Mathematics at Work

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- Relating at Work

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PATHWAY SKILLS

THINKING ON THE JOB

DIAMONITE 2000

Learning to think on the job is one of the most essential skills a worker can possess. Whether you are solving problems, setting goals, locating information, or learning to understand people, thinking on the job is a critical skill.

This training packet is designed to help you explore learning to learn and to think on the job.

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Goals for Diamonite 2000

The following questionnaire are the goals for the Diamonite 2000 training program.

Please answer each question on the answer sheet.

A Strongly agree
B Agree
C Undecided
D Disagree
E Strongly disagree

1. I hope to learn to set goals and follow them through to completion.
   A B C D E

2. I hope to learn to think and reason.
   A B C D E

3. I hope to improve my ability to apply new information.
   A B C D E

4. I hope to learn how I acquire new information.
   A B C D E

5. I want to learn to develop my listening skills.
   A B C D E

6. **I want to better understand what others say.**
A B C D E

7. **I want to learn to develop my problem solving skills.**
A B C D E

8. **I want to further develop my reading skills.**
A B C D E

9. **I want to improve my writing skills.**
A B C D E

10. **I want to better develop my ability to locate, organize and screen needed information.**
A B C D E

11. **I want to develop my speaking skills.**
A B C D E

12. **I want to develop my understanding of math skills.**
A B C D E

13. **I want to develop my ability to apply math skills.**
A B C D E

14. **I want to improve my ability to relate to people at work.**
A B C D E

15. I want to learn to work more effectively in groups.
A B C D E

16. I want to improve my ability to communicate with others.
A B C D E

17. I want to improve my ability to negotiate differences of opinion.
A B C D E

18. I want to learn to manage and cope with stress.
A B C D E

19. I want to improve my time management skills.
A B C D E

20. I want to improve my self-confidence.
A B C D E

Guidelines for Training

1. Treat all with respect
2. Share responsibility
3. Criticize ideas, not people
4. Keep an open mind
5. Ask questions and participate
6. Attend all sessions, be on time
7. Listen constructively
8. Abide by group consensus
9. Respect confidentiality
10. Take your turn

INFORMAL TEST OF LEARNING MODALITIES

I. Auditory Memory

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________

Total Correct ______

II. Visual Memory

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________

Total Correct ______

III. Kinesthetic Memory

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________

Total Correct ______

IV. Combination Memory

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________

Total Correct ______

Auditory Memory ________
Visual Memory __________
Kinesthetic Memory ______
Combination Memory _____

Best Learning Modality:
____

Following are tips when using modalities (auditory, visual, or kinesthetic) in the classroom:

- auditory learners learn by listening and verbalizing. Use songs, rhythms, oral directions, rhymes, and listening in the classroom.
- visual learners learn by seeing and imaging. Use colors, images, shapes, drawings, paintings, and sculpting in the classroom.
- kinesthetic learners (includes tactile or touch learners) learn by doing and manipulating. Use body movements, dance, gesturing, or physical actions in the classroom.

DIAMONITE 2000
PATHWAY SKILLS

Thinking to Learn at Work

Task	Materials	Goals/Strategies
1	Overview of Training - Program Goals	Goals Introduce Thinking to Learn/Talking aloud techniques/Overview of training
2	Pre-training survey	
3	Learning to Learn - Modality Inventory	Initiate the interactive structure of training, cooperative and focused on learning to learn and critical thinking/problem-solving techniques (reading for a purpose, asking questions, explaining answers, working in groups, communicating, using all resources)
4	Competency precheck	
5	Brainstorming	
6	The Think to Learn Strategies	Strategies A.Demonstrate the thinking to learn/talking aloud techniques
		B.Review the need for clear reading, writing, speaking, listening, problem-solving, decision-making strategies.
		C.Introduce Try It, Apply It, Explain It strategies
		D.Develop class policy

7	Recognize fact and opinions	
8	Define thinking	
9	4 Uses for clear, critical analysis	
10	Setting goals	Introduce the success plan
11	Job requirements inventory	

HMWK: Collect all materials you need to read or write to be used after math instruction.

PATHWAY SKILLS
THINKING TO LEARN

Lesson 1

The student will be able to:

1. **Define thinking**

2. **Discuss the difference between a fact and an opinion**

3. **Explain the thinking to learn strategy**

4. **Describe the four uses for clear, logical thinking**

Fact vs. Opinion

What is a fact?

What is a numerical fact?

What is an opinion, judgment, or generalization?

Consider the items below.

Which are facts and which are opinions? Mark F for fact and O for opinion.

1.___ The art of fingerprinting has come a long way.

2.___ Although Sir Francis Galton wrote the first textbook on fingerprinting, an obscure British bureaucrat by the name of Willliam James Herschel was really the first person to use fingerprints to fight crime.

3.___ In 1858, Herschel used fingerprints to catch forgers who were trying to obtain illegal pensions.

4.___ Most people today automatically associate fingerprinting with modern criminal investigation techniques, but, in truth, fingerprinting is more accurately defined as an ancient art.

5.___ The oldest fingerprints ever found appeared on Chinese bills of sale from the third century B.C.

6.___ Fingerprinting did not achieve any real importance in the United States until the early 1900's.

7.___ In 1904, at the St. Louis World's Fair, Scotland Yard detectives taught American detectives how to dust for prints.

8.___ Up until recently, these basic fingerprinting techniques have remained essentially unchanged.

9.___ In the past few years, however, modern technology has revolutionized methods of fingerprinting.

10.___ Computers, amino acids, and laser photography are all being employed today in fingerprinting detection.

From: Writing Clear Paragraphs, 4th ed., Robert B. Donald, Prentice Hall, New Jersey, 1991.

THINKING

What is thinking?

Thinking to learn is a way we make sense of our world.

Consider this scenario

Judy X is working as a kiln loader. You are working with her. Suddenly, you hear a loud scream, you turn around and you can see that her hands are badly burned; they appear red and blisters are already beginning to form. You immediately. . .

How do you work through this problem? There is a logical and systematic way to work through this problem. You would want to consider a series of questions:

1. What is the challenge? Problem? Situation?
2. What happened? What are the facts?
3. What choices do you have? Options?
4. What do I have to do to help Judy?

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Let's consider these questions more carefully.

1. Is there a problem?____________________________________
   ____
   ____

   If so, what is it?______________________________________
   ____
   ____

2. What are the facts?____________________________________
   ____
   ____

3. What choices do I have? Options available? What do I do? Who do I call?

   a. Panic and do nothing

   b. Get ice and put it on her hands

   c. Call for help

   d. Grab Judy and run to the car

   e. Other____
      ____
      ____

4. What are the advantages and disadvantages of each choice?

   a. Panic and do nothing

      Advantage

      Disadvantage

b. **Get ice and put it on her hands**

Advantage

Disadvantage

c. **Call for help**

Advantage

Disadvantage

d. **Grab Judy and run to the car**

Advantage

Disadvantage

e. **Other options**

Advantage

Disadvantage

USES FOR THINKING TO LEARN STRATEGIES

1. To solve problems
2. To work toward a goal
3. To locate and understand information
4. To make sense out of ourselves and others

THINKING TO LEARN

- To solve problems
- *To work toward a goal*
- To locate and understand information
- To make sense out of ourself and others

TO WORK TOWARD A GOAL

Thinking helps us make sense of the world and work by helping us solve problems in clear, organized ways.

It also helps us identify goals and plan ways to reach those goals.

Goals are our targets which we take aim at and strive to achieve.

People behave certain ways for specific purposes. If we understand that our behavior has a purpose or purposes. . .a goal or goals. . .we can begin to understand the goals of our actions by asking the question "Why?" of what we do and think.

In your own words, answer the following questions:

1. Why did you come to work today?

2. Why did you come to training?

Of course, your answers may have created a variety of answers such as:

I want to keep my job.

I want to improve myself.

Whatever you respond, it reveals something about your goals. We make sense out of behavior by asking "Why?"

Note: By asking "why" we will find that the answer leads to another "why?"

Why do you want to keep your job?

Why did you want to improve yourself? .

Let's look at an example.

A person is practicing throwing a baseball.

WHY?

The person wants to win the next game.

WHY?

The person wants to help the team stay in first place.

WHY?

The person wants to see the team win the championship.

The goal: To help the team win the championship

As you can see, the goals can lead to the bigger picture of larger goal patterns.

Take a minute and see how this strategy helps you see your own goal patterns by asking why about each answer.

Why did you come to work today? *(to get paid)*

Why do you want to? *(get paid) (to pay my bills)*

Why do you want to? *(pay your bills) (to maintain a certain standard of living)*

Why do you want to? *(to maintain this standard of living)*

This then, if the goal: to live a certain way.

Goals and how we strive to reach them are critical to us.

THINKING ABOUT YOUR GOALS

1. What is your overall goal for Diamonite 2000?

2. What are 3 reasons why you want to achieve this goal?

3. List some steps that need to be taken in the order to achieve this goal.

4. What could be some roadblocks to achieve this goal?

5. Give a detailed step-by-step way to deal with each problem.*

THINKING TO LEARN

- To solve problems
- To work toward a goal
- ***To locate and understand information***
- To make sense out of ourself and others

Thinking helps us find and understand information.

Locating the right information is necessary to solve problems and to work toward our goals.

Think of a problem you recently encountered on the job.

In order to solve the problem, did you have to locate any information?

1. What information did you need?

2. Where did you find the information?

3. Who were the people, what were the books, or the other resources you used?

Thinking helps make sense of ourself and others.

Later in the section on relating at work, we will explore ways that thinking helps us make sense out of ourself and others.

TRY IT

1. Define thinking

2. Explain the difference between a fact and an opinion.

3. Give two reasons to communicate clearly.

APPLY IT

1. Discuss how you can use the Thinking to Learn process to work toward a goal at work.

EXPLAIN IT

1. In your own words, describe how the Thinking to Learn process can be useful to help you solve a problem at work.

DEFINITION OF THINKING
SUMMARY

THINKING IS AN ACTIVE PROCESS

whether we are trying to solve a problem, reach a goal, understand information, or make sense of someone, we need to *actively use our mind*

THINKING HAS A PURPOSE

we use our mind *directed toward a purpose* **such as solving a problem, reaching a goal, understanding information or making sense of people**

THINKING IS ORGANIZED

we use an *orderly, logical pattern* **to think. There are steps or approaches to take to solve a problem, reach a goal, understand information or make sense of others and ourself**

- **Active**
- **Purposeful**
- **Organized**

THINKING TO LEARN
THE PROCESS

The Thinking to Learn Process	Questions to Explore
Focus on the Challenge	What is the problem? Is there a problem? Is it an opportunity?
Collect the Facts	What is a fact? Ask questions! Who, what, when, where,how. . .Use all resources
Analyze the Facts	Get critical What are the pros? What are the cons? What do we gain? What do we lose?
Refine the Issue, Problem, Opportunity	What are the options? Combine, refine, define ideas.
Select an Option	Choose a solution
Express the Idea	What is the best way to communicate the idea? Write it? Say it? Draw a picture?

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JOB REQUIREMENTS INVENTORY
PART A - KNOWLEDGE-SKILLS LEVELS

OBJECTIVE: Identify the knowledge and skills the job requires.

PURPOSE: Evaluate how clear understanding of the knowledge and skills needed to work can result in job success.

PROCEDURE: Answer the questions below as fully as possible. Attach additional paper if necessary. Use the letter to identify which question you are answering.

PRETEST : Prepare a list of the knowledge and skills you think you now possess in relation to your job. To make this efficient, it is necessary to be as specific as possible. If you state your points in broad, vague terms, the activity is not likely to be useful.

A. What exactly are your job duties?

B. Just what particular skills must you have?

C. What is your experience level?

D. Can you state just what your boss expects of you on a day-to-day basis?

E. To what degree do you feel you meet these expectations?

PART B - FEELING ON THE JOB

REPEAT THE INSTRUCTIONS FOR PART A

1. What are some satisfying results you get from your work?

2. Can you list, in exact terms, what you think of as pressure on the job?

3. Rate your ability to adjust to changing job requirements.

very good	good	not too well	uncertain
A	B	C	D

4. Rate your relationship with others in your work group.

very good	good	not too well	uncertain
A	B	C	D

5. Rate your ability to adjust to different personalities and attitudes of supervisors.

very good	good	not too well	uncertain
A	B	C	D

PART C - THINKING ON THE JOB

6. If initiative means doing things on your own or with very little direction, how do you rate yourself when it is needed?

very good	good	not too well	uncertain
A	B	C	D

7. Do you think you work better with close supervision or without it?

with	without	uncertain	no difference
A	B	C	D

8. To what degree do you think personal judgment is important in your work?

very much	quite a lot	some	very little
A	B	C	D

9. Do you look forward to opportunities to have variety such as different hours or changing schedules?

a great deal	quite a lot	some	no difference
A	B	C	D

PART D - PHYSICAL REQUIREMENTS ON THE JOB

10. What is the state of your overall health as far as you know?

very good	good	not too much	uncertain
A	B	C	D

11. Hand-eye coordination refers to the ability to quickly transfer into action what the eyes see. Rate yourself on this job's requirements.

very good	good	not too well	uncertain
A	B	C	D

12. To what degree is your energy level high enough for this job?

very good	good	not too well	uncertain
A	B	C	D

13. To what degree do you think your sight and hearing are all together good enough in your work?

very good	good	not too well	uncertain
A	B	C	D

PART E - WORKING ENVIRONMENT

14. Would your rate your general working conditions:

very good?	good?	undesirable?	uncertain?
A	B	C	D

15. Are safety measures:

very good?	good?	adequate?	don't know?
A	B	C	D

16. Are pay rates according to the skills needed:

very good?	good?	below average?	don't know?
A	B	C	D

17. Are working hours for all shifts:

highly acceptable?	acceptable?	needs improvement?
A	B	C

undecided?
D

PATHWAY SKILLS

Lesson 2

The student will be able to:

1. Define stress

2. Recognize signs and symptoms of stress

3. Understand the causes of stress

4. Understand how susceptible one is to the negative effects of stress

5. Recognize coping strategies

STRESS MANAGEMENT SEMINAR

AGENDA

I. What is stress?

II. How can I know if I've got it?

III. What causes it?

IV. How vulnerable am I?

V. What can I do about it?

STRESS is ________________

LION!

↓

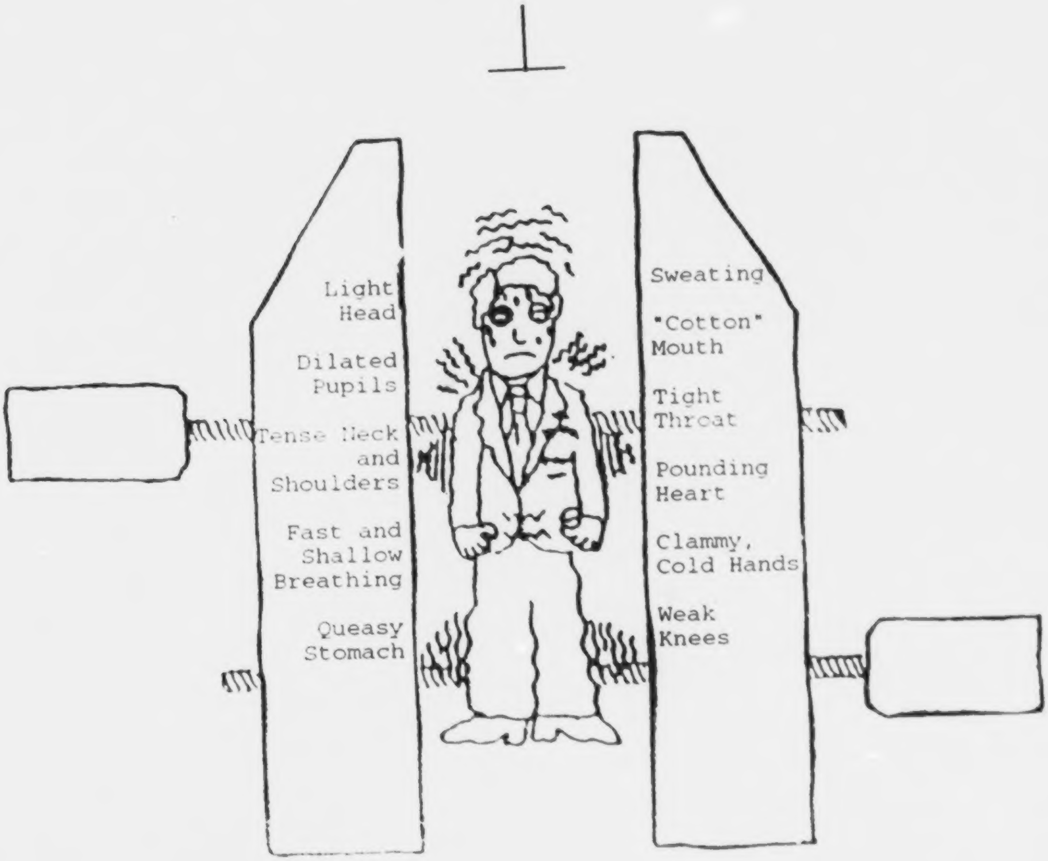
THREAT

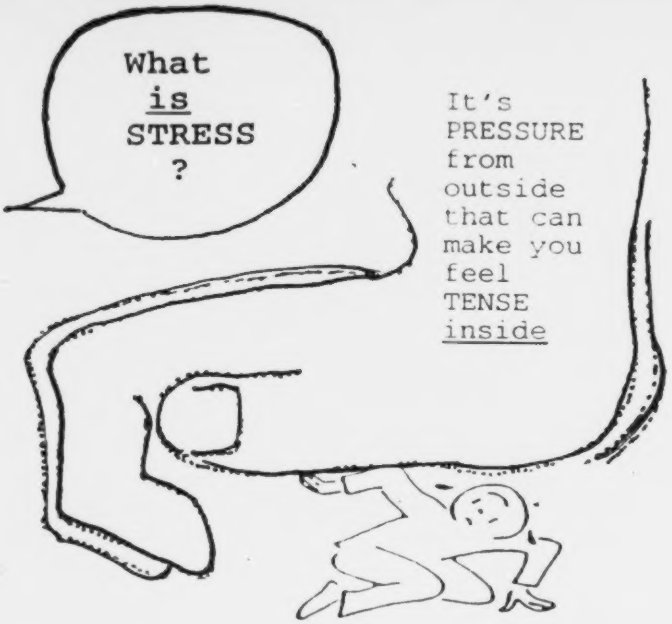
↓

ALARM

↙ ↘

Fight or Flight


Light Head
Dilated Pupils
Tense Neck and Shoulders
Fast and Shallow Breathing
Queasy Stomach
Sweating
"Cotton" Mouth
Tight Throat
Pounding Heart
Clammy, Cold Hands
Weak Knees


What is STRESS ?
It's PRESSURE from outside that can make you feel TENSE inside

Stress is an unavoidable FACT OF LIFE.

SOME stress is a part of daily life--it affects everyone. Certain kinds are actually helpful--they keep you on your toes.

BUT--
TOO MUCH stress on your mind and body can make you miserable--worried, sad and ill.

Definitions of Stress:

"Any strain or pressure on the body or mind."
"Pressure from the outside that can make you feel tense inside."
"Your body's physical, mental, and chemical reaction to circumstances that frighten, excite, confuse, endanger, or irritate you."
"The ordinary and extraordinary pressure of life that confronts every individual."
"The sum total of all those things your body does to prepare for 'fight or flight'."
"Anything at all that places a physical or psychological demand on you."
The nonspecific response of the body to any demand made upon it."

> **"STRESS IS WHAT OCCURS WHEN THE DEMANDS OF THE ENVIRONMENT IN THE PERSON'S EYES CLEARLY EXCEED THE RESOURCES OF THE PERSON TO HANDLE THEM."**

Conclusion: Stress is common to all living organisms. Complete freedom from stress is death. - Selye

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Stress Checklist

Check off the symptoms in each category that you experience. The more checks you have, the more that stress may be getting to you.

PHYSICAL SYMPTOMS

- Headaches ☐
- Digestive problems ☐
- Insomnia ☐
- Oversleeping ☐
- Rashes or other skin problems ☐
- Sexual difficulties ☐
- Elevated blood pressure ☐
- Chest pain ☐
- Heart palpitations ☐
- Loss of appetite ☐
- Constant hunger ☐
- Neck or back spasms ☐
- Chronic fatigue ☐
- Jaw pain ☐
- Dizzy spells ☐
- Nausea ☐
- Frequent urination ☐
- Feeling unusually warm or cold ☐
- Night sweats ☐
- Constant perspiration ☐
- Swollen joints ☐

BEHAVIORAL SYMPTOMS

- Finger-tapping ☐
- Foot-tapping ☐
- Compulsive eating ☐
- Nail-biting ☐
- Hair-pulling ☐
- Repetitive thoughts ☐
- Increased smoking ☐
- Increased alcohol use ☐

EMOTIONAL SYMPTOMS

- Increased moodiness ☐
- Withdrawal from other people ☐
- Difficulty concentrating ☐
- Loss of memory ☐
- Increased restlessness ☐
- Frenetic activity ☐
- Difficulty making decisions ☐
- Annoyance at little things ☐
- Shyness or oversensitivity ☐
- Frequent crying ☐
- Thoughts of suicide ☐
- Fear of criticism ☐
- Easily aroused anger ☐
- Nightmares ☐
- Hopeless outlook ☐

CAUTION: If any of these symptoms persist, consult your doctor.

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CAUSES

SOCIAL

Change/Adaptation
Frustration
Overload/Deprivation
Relational conflict
Pressure/Time
Confusion

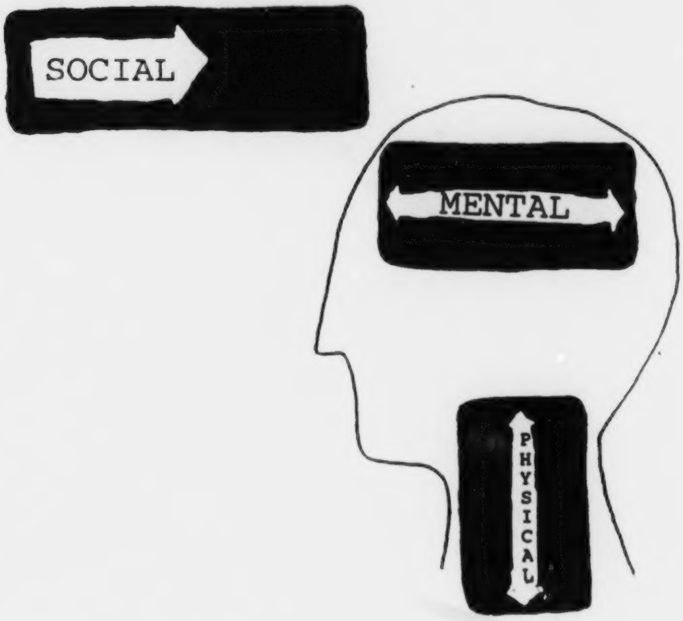
PSYCHOLOGICAL

Self-Perception
Behavioral Patterns
(Habits)
Personality type
(Type A)
Thoughts

PHYSICAL

Biorhythms
Nutrition
Diet
Noise
Health
Exercise

WHERE IS YOUR STRESS COMING FROM?



Four Solutions to Deal with Stress:

1. Change the situation
2. Change yourself - behaviors
3. Change the way you think about it
4. Quit

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Stress Management

Most people have accepted stress as a normal part of their daily life, and even though everyone has to deal with it, few seem to understand it and know how to cope effectively. Some stress is necessary for an optimal level of health and performance, however, chronic stress may lead to chronic distress, increasing the risk for many health disorders. The proper management of stress can avoid the contribution of stress to these health disorders.

Researchers are now able to identify a number of factors that can affect the way in which people handle stress. How they deal with these factors can actually increase or decrease their vulnerability to stress. This survey helps to identify particular areas where improvements in coping with stress can be made. Most of the items describe situations and behaviors that are within a person's own control. On the survey, individuals rate themselves on a scale from 0 (rarely) to 2 (often) according to how each statement applies to them. The final stress vulnerability rating is obtained by totaling the points.

Complete the following Self-Scoring Table and add up your total score.

Self-Scoring Test for Stress Management

Circle the appropriate number for each item.

	Conduct	Often	Sometimes	Rarely
1.	I experience unexplained headaches and backaches.	2	1	0
2.	When I'm nervous I eat/drink/smoke.	2	1	0
3.	When problems are not immediately solved I get worried.	2	1	0
4.	I feel tired and restless.	2	1	0
5.	I work at completion of tasks very close to the deadline.	2	1	0
6.	My mood changes.	2	1	0
7.	I'm too busy to allow time for physical activity.	2	1	0
8.	I'm concerned on more than one problem and can't concentrate well.	2	1	0
9.	People at work or home make me feel tense.	2	1	0
10.	When people disagree with me I challenge them and feel as though I should not yield.	2	1	0

Maximum Score = 20

My Total Score = ______

Circle Below Your Category

Grade	Score	Unmanaged Stress Level
A	0-3	Very Little
B	4-8	Some
C	9-13	Moderate
D	14-17	Too Much
E	18-20	A Great Deal

To decrease vulnerability to stress, an individual should modify the behaviors in which a rating of 2 was obtained.

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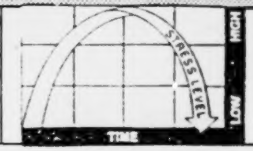
POSITIVE STRESS

Positive stress can help you concentrate and focus, but it can also literally help you to survive. Your physical stress response helps you to meet challenging (or threatening) situations and is an automatic and essential fact of life.



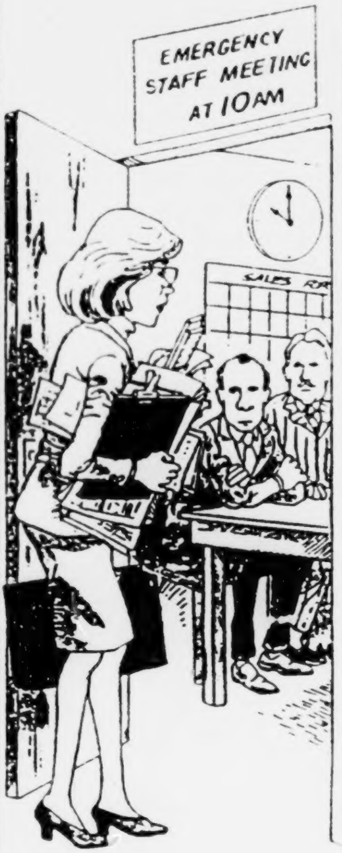
Muscles tensed

Heart pounding

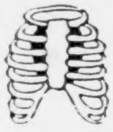
Blood pressure up

Hands cold and clammy

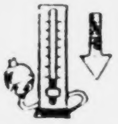
Stomach tensed


EMERGENCY STAFF MEETING AT 10AM
SALES

Muscles relaxed



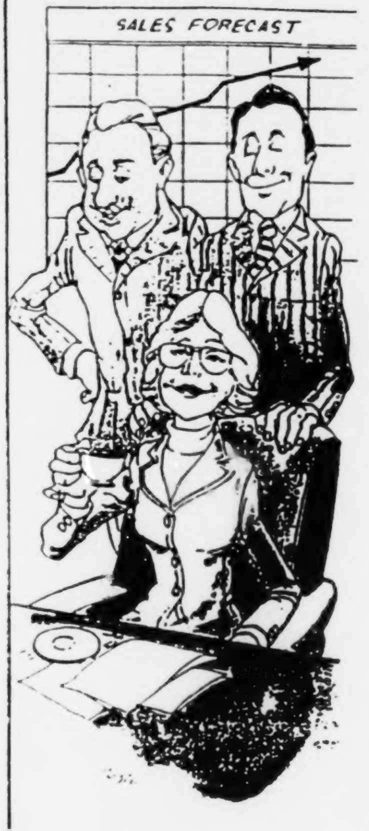
Heart normal



Blood pressure normal

Hands warm and dry

Stomach relaxed



Stress

Do you know how your body reacts when under stress? Your stress (**arousal**) response is automatic-when faced with a challenging situation, your muscles tense, your heart rate and blood pressure increase, you may perspire more, and you may even notice a gripping sensation in your stomach. You may also feel more mentally alert and focused. This stress response prepares your body to meet an immediate, recognizable challenge. Positive stress is short-term, for as soon as the challenge has been met, or the threat has been dealt with, your body relaxes and returns to normal.

Relaxation

When stress is positive, your body automatically relaxes after you've handled the situation that caused your stress response. Your muscles relax and your heart rate, blood pressure, and other physical functions all return to their normal, pre-stressed state. This relaxation response is the most important aspect of positive stress, because it allows you to rest and gather the physical and emotional energy you need to meet the next challenge. Positive stress is a series of arousal and relaxation responses that help you deal with the changes and challenges of daily life.

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NEGATIVE STRESS

Your physical reaction to stress is always the same, but with negative stress your body stays geared-up and doesn't relax. When stress becomes chronic and ongoing, your physical and emotional health can suffer.

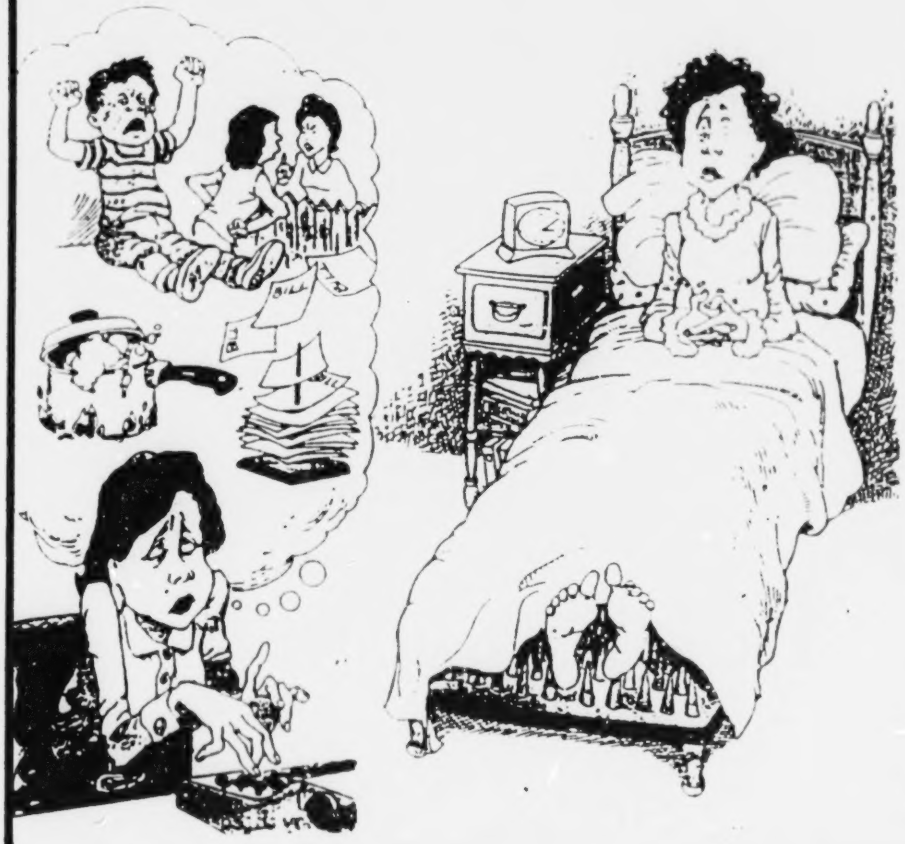
Muscles in knots

Heart rate soars

Blood pressure soars

Hands perspire

Stomach in knots



Stress

Your automatic physical reaction to a stressful situation is the same whether you are experiencing positive or negative stress. (Your body is smart, but it doesn't know which stress will be short-term and which will be continuous!) With negative stress, your muscles still become tense, and your heart rate and blood pressure soar. You may still perspire more and feel the same type of "knot" in your stomach. INshort, positive and negative stress share the same response mechanism, but in negative stress your response stays stuck in the "on" position-you can't quite turn it off.

No Relaxation

With negative stress, there is no true relaxation between one stress "crises" and the next. When your body remains geared-up, physical and emotional strain can result. Smoking, using drugs, or drinking alcohol do not relieve stress-they only add to the problem. Left uncontrolled, negative stress can lead to high blood pressure, ulcers, migraines, heart attacks-and worse. Fortunately, you can stop the cycle of negative stress by becoming aware of your stress (and how you react to it), by practicing relaxation techniques, and by developing a positive attitude and lifestyle.

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HOW DO YOU COPE?

How do you cope with the stress in your life? There are numerous ways - some are more effective than others; yet some coping strategies may actually be as harmful as the stress they are used to alleviate. This scale was created largely on the basis of results compiled by clinicians and researchers who sought to identify how individuals effectively cope with stress. This scale is an educational tool, not a clinical instrument. Therefore, its purpose is to inform you, the reader, of ways in which you can effectively and healthfully cope with the stress in your life, while at the same time, through a point system, give you some indication of the relative desirability of the coping strategies you are currently using.

Simply follow the instructions given for each of the 14 items listed below. When you have completed all of the items, total your points and place that score in the box provided.

____ 1. Give yourself 10 points if you feel that you have a supportive family around you.

____ 2. Give yourself 10 points if you actively pursue a hobby.

____ 3. Give yourself 10 points if you belong to some social or activity group that meets once a month (other than your family).

____ 4. Give yourself 15 points if you are within five pounds of your "ideal" body-weight considering your height and bone structure.

____ 5. Give yourself 15 points if you practice some form of "deep relaxation" at least three times a week. Deep relaxation exercises include meditation, imagery, Yoga, etc.

____ 6. Give yourself 5 points for each time you exercise thirty minutes or longer during the course of an average week.

____ 7. Give yourself 5 points for each nutritionally balanced and wholesome meal you consume during the course of and average day.

____ 8. Give yourself 5 points if you do something that you really enjoy which is "just for you" during the course of an average week.

____ 9. Give yourself 10 points if you have some place in your home that you can go in order to relax and/or be by yourself.

____ 10. Give yourself 10 points if you practice time management techniques in your daily life.

____ 11. Subtract 10 points for each pack of cigarettes you smoke during the course of an average day.

____ 12. Subtract 5 points for each evening during the course of an average week that you take any form of medication or chemical substance (including alcohol) to help you sleep.

____ 13. Subtract 10 points for each day during the course of an average week that you consume any form of medication or chemical substance (including alcohol) to reduce your anxiety or just calm you down.

____ 14. Subtract 5 points for each evening during the course of an average week that you bring work home; work that was meant to be done at your place of employment.

☐ NOW CALCULATE YOUR TOTAL SCORE AND PLACE IT IN THE BOX ON THE LEFT. A "PERFECT SCORE" WOULD BE 115 POINTS. IF YOU SCORED IN THE 50-60 RANGE, YOU PROBABLY HAVE AN ADEQUATE COLLECTION OF COPING STRATEGIES FOR MOST COMMON SOURCES OF STRESS. HOWEVER, YOU SHOULD KEEP IN MIND THAT THE HIGHER YOUR SCORE, THE GREATER YOUR ABILITY TO COPE WITH STRESS IN AN EFFECTIVE AND HEALTHFUL MANNER.

This stress assessment test was created by Dr. George S. Everly, Jr., University of Maryland.

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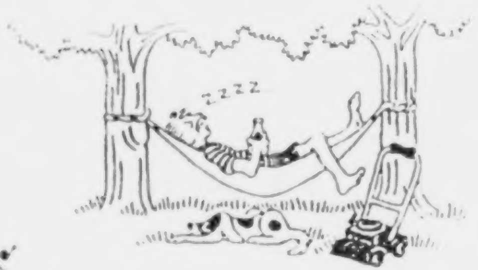
Stress Saver

Ways to deal better with the stress in your life.

ease on down the road!

Do you rush through each day trying to meet impossible deadlines? You may help lower your stress by better managing your time. Be realistic in your goals-and establish priorities. Try using "to do" lists as an aid in organizing your time. Schedule time each day to relax-even if it's only for a short time.

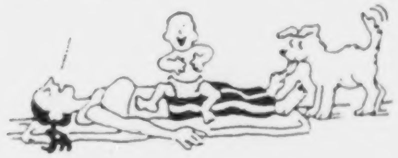
take a mental vacation!



Sit or lie down where you
can be quiet and alone.
Close your eyes.
Imagine a restful place,
a favorite room, a place
at the shore or mountains.
Or simply focus on a word
or phrase such as,
"I am calm."
If your thoughts wander,
don't get upset.
Just refocus.
Try doing twice a day,
20 minutes at a time.

sing,
dance,
exercise
that
stress away!

I am calm... I am calm...



Exercises can help you deal with stress. Walking, dancing, swimming are all good. Check with your doctor before starting an exercise program. And keep getting regular blood pressure checks!

Health Information Services, Merck Sharp & Dohme, West Point, Pa. 19486

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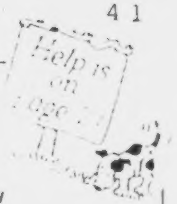

Stress Saver

Under stress? You can get it under control!

stress and your blood pressure

Is there a link between stress and high blood pressure? Effects may vary, but when you're under stress, your mind and body go into high gear. Repeated stress and tension over time appear to contribute to an increase in blood pressure in some people.

your stress is your own!

Do you feel under stress? Then you are.
Someone may tell you, "You don't have any big problems. You shouldn't feel under stress."
The fact is, if you *feel* under stress, you *are*.
Stress-like any feeling-is very personal.

how does stress feel to you?

Physical symptoms - like upset stomach, loss of appetite, overeating, chronic headache, insomnia, rashes, rapid heartbeat - are signs of stress. Some feelings can be, too. Do you have any of the ones listed below?

- ☐ anxious
- ☐ apathetic
- ☐ depressed
- ☐ flustered
- ☐ frazzled
- ☐ frustrated
- ☐ harried
- ☐ hurried
- ☐ irritable
- ☐ overworked
- ☐ panicked
- ☐ pressured
- ☐ tense
- ☐ tired
- ☐ uptight
- ☐ worn out
- ☐ worried
- ☐ wound up

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GATEWAY SKILLS

COMMUNICATING AT WORK

DIAMONITE 2000

Giving and receiving clear and effective messages is critical to today's work force. Reading, writing, listening and speaking are skills all workers need in order to be high performance employees.

This training packet is designed to help you improve your communication skills on the job.

© Copyright 1993 Jean S. Opliger and Fred Holcomb, Ohio State University Agricultural Technical Institute, Developed with a grant from the U.S. Department of Education.

COMMUNICATING AT WORK

Lesson 5

Listening on the Job

The student will be able to:

1. Discuss the communication model
2. Define listening
3. Distinguish between listening and hearing
4. Explain active listening

5. Discuss the barriers to effective listening

6. Recognize the message in the words and the feelings

GATEWAY SKILLS

LISTENING AT WORK

Lesson 5

Competency Precheck

1. Listening and hearing are the same thing.
   a. True
   b. False
2. All people who speak English attach the same meaning to the works they use.
   a. True
   b. False
3. Feedback is not essential to understanding another person.
   a. True
   b. False
4. We spend most of our day talking at work.
   a. True
   b. False
5. The biggest problem with listening is that it is taken for granted.
   a. True
   b. False

6. You can think about 4 times as fast as you can listen.

   a. True

   b. False

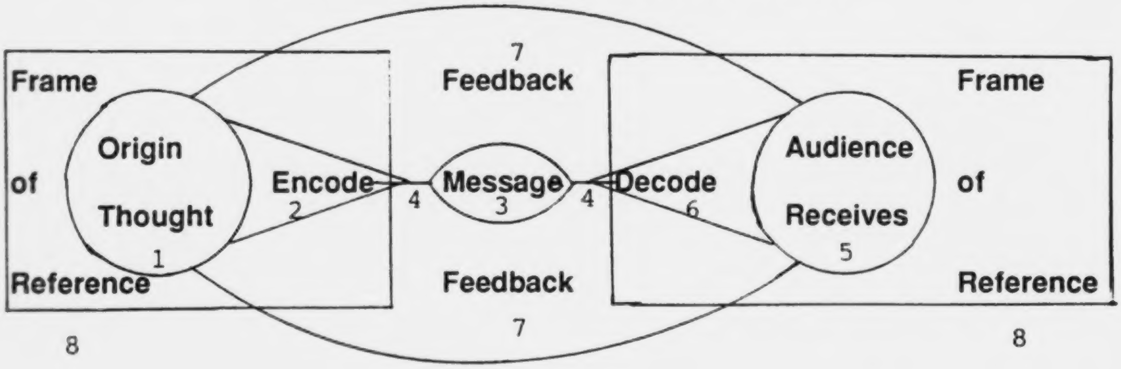
DEFINING COMMUNICATION

We use speaking, listening, reading and writing when we communicate. In fact, the more effective we are, the better able we are to demonstrate these skills. But we use other skills as well. We use our ability to interpret words, symbols and behavior.

Thus, we use communication to help us solve problems, work toward goals, locate and understand information and make sense out of the world at work.

Let's look at the Thinking to Learn Process as it applies to communication as a continuing process.

COMMUNICATION AS A PROCESS



7
Feedback
Frame
of
Reference
Origin
Thought
1
Encode
2
4
Message
3
4
Decode
6
Audience
Receives
5
Frame
of
Reference
Feedback
7
8
8

1. Origin
2. Encode
3. Message
4. Channel
5. Audience
6. Decode
7. Feedback
8. Frame of Reference

There are 4 skills essential to achieving clear, effective communication. Those skills are: listening, speaking, reading and writing.

LISTENING

We spend at least 55% of the day listening on the job and yet listening is the least taught of all of the skills. Listening is a critical skill.

Take a few minutes to participate in the following exercise on listening.

Define Listening

While HEARING is the physical process of receiving sounds, LISTENING is the ability to attach meaning. In order to listen effectively, one must be an ACTIVE, ASSERTIVE AND CRITICAL listener.

ACTIVE listening takes effort and energy. We need to focus on the information we are gathering. ASSERTIVE listening means we seek knowledge that accurately reflects the message given. Finally, CRITICAL listening means we seek to accurately interpret what we hear.

Consider this scenario

George and Zack work together in the Body Shed. Zack is filling the vat with medium. George took a sample and claims the mix is inappropriate. What do both George and Zack need to do to assure each is listening to the other actively.

HOW WELL DO YOU LISTEN?

Listen to the tape

Answer the following questions:

1. Where does the speaker come from?

2. When was he born?

3. What were his 3 dogs' names?

4. What did John Eubanks do?

5. What were the 2 ways to hunt raccoon?

6. What was his brother's name?

7. What type of tree did the dogs do something in?

8. What did John poke at in the tree?

ANSWER THE FOLLOWING QUESTIONS IN YOUR OWN WORDS

1. To listen actively, what do both George and Zack need to do?

2. To listen assertively, what do both George and Zack need to do?

3. To listen critically, what do both George and Zack need to do?

THE THINKING TO LEARN PROCESS

The Thinking to Learn Process

Listening	Questions to Explore
Focus on the Message (Be active)	What is the other person thinking? Feeling? Am I giving this person my full attention?
Collect the facts (Be assertive)	Am I listening to both verbal and nonverbal messages? Did the other person say what I heard? Did I hear what they said?
Analyze the facts *(Be critical)	Am I asking questions, seeking to understand and trying to interpret?
Recognize the feelings	Am I watching body language, tone of voice, unspoken clues?
Watch assumptions, avoid judgments	Ask the person, "Are you saying___?
Allow the person to express feelings and concerns. Often the feeling must be out before the logical ideas can be released.	Am I letting the person get the emotion out and concentrating on the message?

*Note: Critical here means to seek understanding, explore meaning. It does not mean to put down or demean.

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SUMMARY

EFFECTIVE LISTENING IS:

- **Active**
- **Assertive**
- **Critical**

LISTENING

INEFFECTIVE LISTENING:

Barriers to communication

PROCEDURE: (COMPETENCY CHECK)

Write a paragraph giving a frank and sincere description of how your listening measures up to the requirements of the job. Try to recall actual cases in which better listening might have made a difference. Organize your paragraph by prewriting or making a "grocery list" of points to include in your writing. Lator you will be given an opportunity to compare your ideas with those the instructor will discuss with you.

The biggest problem about listening is that it is taken for granted. After all, listening doesn't involve visible moving parts like those in talking or seeing. Even taste has a moving part----- the tongue. It may come as a surprise that listening is a learning skill in the same way as reading or writing, but it is often left out in discussions.

Good listening, however, can and does matter a great deal for success on the job, in school and just in getting along with people every day.

Dr. Ralph Nichols of the University of Minnesota has suggested nine bad listening habits which provide a checklist each of us can profit from if we take the trouble to use it. Here's the list:

1. Daydream Listening
2. That's-what-you-Think Listening
3. Over-my-Head Listening
4. Fake Listening
5. Memory-Test Listening
6. Take-It-All-Down Listening
7. Shut-Ear Listening
8. Personality Listening
9. Half-An-Ear Listening

1. DAYDREAM LISTENING

A. We can think faster than we can speak (about four times as fast), resulting in spare time for the words to catch up with the thinking. In the meantime our thoughts drift away from the subject being discussed or explained.

2. SHUT-EAR LISTENING

A. This happens when you think you already know all about the subject or it's all just so boring.

3. THAT'S-WHAT-YOU-THINK-LISTENING

A. You are ahead of the game, or at least that's your opinion. You don't like it when people might disagree with your plan, so you tune them out.

4. FAKE LISTENING

A. How do you feel when you're talking with someone about an important work procedure and you know he or she is only pretending to listen? We are rarely fooled by this sort of thing.

5. OVER-MY-HEAD LISTENING

A. You feel you just don't understand it. The whole idea is too difficult. Well, maybe it is, maybe it isn't. There's always the chance that the fault lies partly in not listening well.

6. MEMORY-TEST LISTENING

A. If you have a lot of confidence in your ability to remember instructions or facts, why write them down? It's clearly better to do the more reliable thing.

7. TAKE-IT-ALL-DOWN LISTENING

A. This is hardly ever a good idea. Listening and writing at the same time aren't easy, so pick out the main points by giving close attention.

8. PERSONALITY LISTENING

A. This means that you let yourself get off the listening track by paying too much attention to how the speaker looks or he talks instead of what he says.

9. HALF-AN-EAR LISTENING

A. Are you equally good at listening to more than one sound at the same time, such as a speaker and a warning bell on your machine? Few people are.

Developed by Fred Holcomb

COMPETENCY POST CHECK

Write a paragraph (your first sentence should explain just what it is you're about to discuss) in which you compare the points you made in your pretest with the nine common listening faults we've discussed. Of course it is unlikely that you used the kind of " labeling" your instructor used, but in any case you may have had come close to describing some of the same listening problems. Be sure to point out how being alert to those ideas can result in fewer errors and frustrations on the job. Restate your first (topic) sentence for a conclusion that indicates whether or not the activity has strong applicability to your work.

TRY IT

1. Define active listening.

2. Explain the difference between hearing and listening.

APPLY IT

1. Discuss how to be assertive in collecting good information.

EXPLAIN IT

1. In a group, determine how the Thinking to Learn Listening Process can be used to better understand another person in your department. Remember: focus on issues, not people.

GATEWAY SKILLS
READING AT WORK

Lesson 6

The student will be able to:

1. Define reading on the job.
2. Determine the important differences between reading for information and reading for understanding.
3. Recognize the need for purposeful reading.
4. Indicate an awareness of the importance of attitude and experience in reading on the job.
5. Recognize that shop (functional) reading is a thinking - learning process.
6. Note the need to master specialized and technical terminology on the job.
7. Determine how consistent use of the independent, instructional, and frustration reading levels concept can be helpful at work.

GATEWAY SKILLS

READING ON THE JOB

Lesson 6

Competency Precheck

1. We read for a purpose such as:

   A. To be entertained

   B. To locate information

   C. To understand

   D. All of the above

   E. None of the above

2. Ideally we read to accomplish all of the above purposes.

   A. True

   B. False

3. Understanding what a writer says results in understanding.

   A. True

   B. False

4. **It is possible to get information without understanding the writer's point.**

   A. True

   B. False

5. **Effective reading is passive.**

   A. True

   B. False

GATEWAY SKILLS
READING ON THE JOB

When we read, we have a purpose such as:

1. To be entertained
2. To find information
3. To understand

Note carefully that all three of these considerations provide a purpose for reading.

The ideal reading situation is one in which all three purposes occur at the same time.

Reading on the job can be defined as starting at point A (a condition of knowing little or nothing about the task) and moving to point B (Gaining some or a lot of knowledge about the procedure).

Point A ————————————————	Point B
Little/ Nothing Known	Knowledge Gained/ Understanding

11 IMPORTANT IDEAS ABOUT READING ON THE JOB

1. Effective reading is active, not passive.
2. When you know what a writer says, you get information.
3. When you know what he/she means and why he/she says it, you get understanding.
4. What you get from reading depends to a large extent on what your purpose is.
5. You can often get information from reading with little effort, but not much understanding.
6. Learning includes understanding, not only collecting information.
7. Since on-the-job reading is functional and non-fiction, information is the immediate priority, but understanding should result in the longer term.
8. After reading new technical material, it is important to realize that although we may have gained information, it is less likely that we receive full understanding.
9. When you read a blueprint, your purpose is to translate a conceptual form into an equivalent objective form. Having a clearly defined purpose in mind is the least demanding way to get both information and understanding from reading.
10. Our ability to make functional reading work for us can and often does depend upon our attitudes and confidence.
11. Workplace reading is most effective when it is thought of as a tool to help get the job done right the first time.

TRY IT

1. When you read a new recipe, your purpose is mainly entertainment, information, and understanding. Explain your answer.

2. The comic strip, "Blondie", is read for information, understanding, and entertainment. Do you agree? Why or why not.

3. Which is most important in reading the directions on your doctor's prescription? Understanding, entertainment, or information. Be specific. Explain.

4. **Why is having a clear purpose for reading on the job so important?**

5. **We say that reading should be active, not passive. Write your best response to what you think this means.**

6. **Is it realistic to expect technical reading such as that at Diamonite to be easy? Explain.**

7. **Name two ways you think reading is a thinking and learning process.**

   A.

   B.

8. In shop reading, cause and effect relationships are important. Discuss this.

9. Describe how you might go about reading a set of directions for a job in your department. Do you use technique A or B? Explain.

   A. A quick skimming, followed by a careful reading.

   B. One slow reading.

10. On the job, what will usually be a main purpose for reading?

11. At work we need to know what to read, how to read it, why we're reading it, and finally what to do with the information. Describe one occasion in which you experienced any of these needs.

12. Do you find you must reread material because "you didn't get anything out of it?"
Often A lot Once and a while Never
What do you need to do to get meaining?

13. On a scale of 1-5, how would you rate your ability to pay attention to what you read?
1 2 3 4 5

14. Whenever you need to read something connected to your job, do you first give some thought to just what it is you want the reading to do for you? Explain this.

15. Have you ever considered asking yourself two or three questions about reading you need to do, then testing yourself to see if you got useful answers after you did the reading?

16. How do you respond to this statement? "Most reading is more or less difficult, and I don't have a lot of patience with hard material."

17. If vocabulary, (the stock of words we knew) can be classified as general and specialized or technical, do you think you usually recognize in which class a particular word (term) belongs? Give examples of general, specialized and technical terms used in your department.

18. What appears to be simple words often have very narrow specialized or technical meaning (in which case they are called terms). Consider, for instance, the little words "base" or "set". These words have altogether different meanings in general math, geometry, chemistry, or psychology. List at least five specialized or technical terms in your job specialty.

19. List at least five terms used in other departments at Diamonite.

20. Why is the mastery of the terminology an essential reading skill on the job?

21. Using your best judgment, choose the item below that best indicates what you consider to be a reading difficulty. Circle it. Explain why.

    1. Lack of background in general reading
    2. Limited experience
    3. Trouble remembering key terms
    4. Reading to follow directions
    5. Concentration
    6. Problem with thinking in terms of printed words
    7. Getting the "point" of it
    8. Reading new terms (decoding)

22. We can agree that looking at words is not reading. Readers must figure out what the writer actually said and respond accurately. Discuss this.

23. Pieces of writing, whether shop memoranda, paragraphs, chapters or whole books, are guided by a MAIN IDEA, - that is, they are about something. Stating clearly this main idea is the key to comprehension in reading.

Consider this non-technical paragraph

Thousands of deaths last year are directly linked to cigarette smoking. In addition, lingering illnesses such as emphysema, heart disease, allergies, and various cancers attributed to smoking cost billions in time lost on the job and threaten to wreck the medical system. One need not be a smoker himself to risk these consequences either. Secondary smoke is believed to be equally dangerous. Cigarette smoking is a leading health hazard.

Underline the sentence which is the main idea of the paragraph.

24. Is it possible to get information from shop reading yet miss out in understanding? Explain how this might be possible.

25. In order to demonstrate that understanding, in addition to information, has been received, what must people be able to do after reading, say, a blueprint? Comment on this.

26. We need not consider reading a thinking process because the writers have already taken care of that for us.
True False

27. The transfer of ideas from the page to the mind of the reader is the purpose of reading. Indicate in general how you think you are able to make this transference (note the use of transfer as a technical term).
Very well Well Somewhat Poorly Not sure

28. To me fettle is a:

A. Technical or specialized term
B. General word

29. Kilogram ____

Slurry ____

Culture ____

Imperceptible ____

Fettle ____
(Technical or General)

Ratio ____

Concentric ____

Flow lines ____

PVA ____

Inexplicable ____

0 - I don't know the word

1 - I think I know it in a general way

2 - I know the word and can use it in reading and writing

30. If on-the-job reading can be defined as starting at point A (a need to know) and moving to point B (learning what you needed to know), evaluate how this packet has alerted you to the value of improving your reading skills. Discuss fully.

31. **One of the most useful ideas in reading is the notion of independent, instructional, and frustration levels and all of us have them.**

    A. **The independent level means just that. You are able to read certain material with at least 90% comprehension and with hardly any vocabulary difficulty.**

    B. **The instructional range is broader, roughly 70% to 90% comprehension with equivalent vocabulary ability. The level is called instructional because with help the reader can often handle the reading well.**

    C. **The frustration level also explains itself. It is the point where the reading is too difficult for a variety of reasons. It does not necessarily indicate a reading deficiency. For example, frustration for anyone can and often does occur when we try reading about subjects we know little about (and there are plenty of those to go around!) and especially highly technical and specialized topics loaded up with terminology. It is not a putdown for readers to frankly admit it when they have problems with a particular reading.**

32. **Study this paragraph.**

    Figurative language adorns and enlivens writing to such an extent that without it reading would be far less interesting far more pedestrian. Good writing uses metaphor, simile, conflict, setting, irony, paradox, characterization, theme, inference, implication, connotation, satire, tone, allusion, euphemism, hyperbole and idiomatic language.

Although this paragraph is not on what we typically call a "technical", workplace topic, it nonetheless illustrates the independent, instructional, and frustration level principle. For one thing, it is packed with terms just as a shop instruction sheet might be.

Question: To tag this passage at an independent level, what lines of work would the readers likely be doing? Estimate the amount of help (instructional level) you would need to bring it into your independent level.

APPLY IT

1. Cross out every term in the paragraph of item 32 which is not at your independent level. Notice what remains. Now we see how essential it is "to come to terms".

2. Go back to item 29. See if you did better on the specialized terms than on the general words.

3. Prepare two questions about the figurative language paragraph for which you would like to find the answers.

4. Check your "Thinking to Learn Chart". Which questions apply here?

5. Prepare a list of at least ten key specialized or technical terms used in your department and share them with other workers in different departments.

EXPLAIN IT

1. **To what extent has this general discussion alerted you to some basic aspects of reading you hadn't considered before? For example, in what manner is it useful to evaluate on-the-job reading (or any other) at independent, instructional or frustration levels?**

2. **Explain the importance of mastering the terminology on your job.**

Developed by Fred Holcomb

THE THINKING TO LEARN PROCESS
READING ON THE JOB

Reading	Questions to Explore
Focus on the Purpose (Be active)	What is the purpose? Why am I reading? What do I need to understand? What problem am I trying to solve?
Collect the Facts (Be assertive)	What information do I need? Do I need to check other resources?
Analyze the Facts (Be critical)	Since my goal is to understand, what questions should I ask?
Consider Options? Choices?	What other information do I need? What resources should I contact?
Check attitudes, viewpoints	Am I seeking positive information?
Master specialized terminology	Do I understand the meanings as they apply on this job?
Check accuracy of understanding	Am I understanding the writer?

SUMMARY

READING IS:

- ACTIVE
- PURPOSEFUL
- INFORMATION-BASED
- UNDERSTANDING FOCUSED

WORKSHEET 1

READING AT WORK

Locating Information

OBJECTIVE: **Skim to find specific information.**

PURPOSE: **Identify time-saving but effective ways to get only what is needed at a given time and need.**

PROCEDURE: **Use the accompanying schedule. Check each item in your Thinking to Learn Process Chart.**

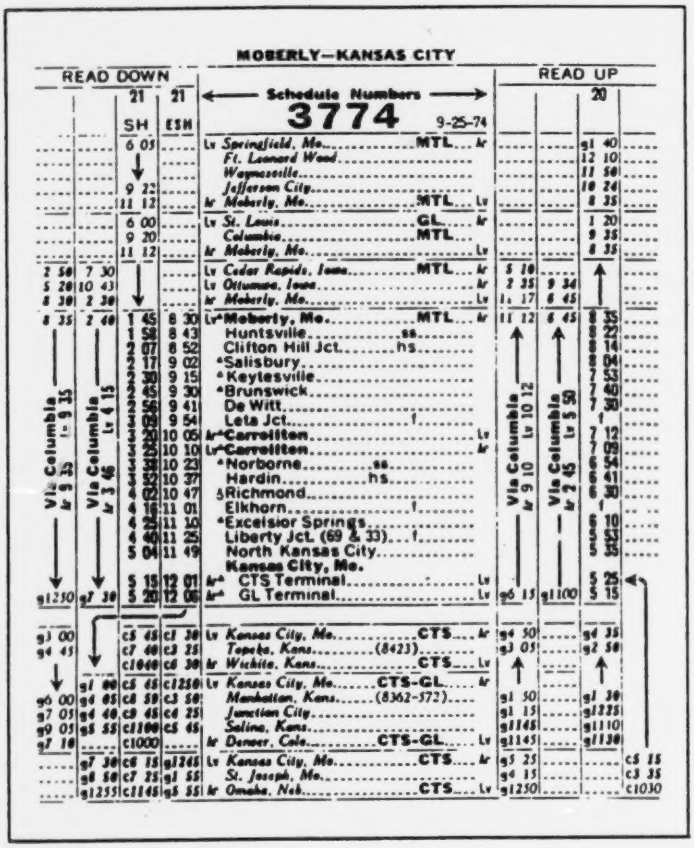
TRY IT

Scenario

You are scheduled for a job interview next week, and you have a one-time-only chance, so you must not misread your bus schedule. This job is really important to you and the competition is tough. But that's not all. If you are hired, the work will involve traveling among the towns listed on the schedule, and since you don't own a car, you must use the bus. Remember that the interview may include questions testing how well you can read the schedule. First skim (do not read) the whole schedule, then focus only on finding the exact information you need. Try for speed.

1. **You live in Moberly and your interview is in Kansas City on Tuesday at 1:30 p.m. You should take the bus at what time?**

READING AT WORK SCHEDULE



MOBERLY—KANSAS CITY

Schedule Numbers **3774** 9-25-74

READ DOWN						READ UP			
		21	21					20	
		SH	ESH						
		6 05		Lv *Springfield, Mo.*	MTL Ar			g1 40	
				Ft. Leonard Wood				12 10	
				Waynesville				11 50	
		9 22		*Jefferson City*				10 24	
		11 12		Ar *Moberly, Mo.*	MTL Lv			8 35	
		6 00		Lv *St. Louis*	GL Ar			1 20	
		9 20		*Columbia*	MTL			9 35	
		11 12		Ar *Moberly, Mo.*	Lv			8 35	
2 50	7 30			Lv *Cedar Rapids, Iowa*	MTL Ar	5 10			
5 20	10 43			Lv *Ottumwa, Iowa*	Ar	2 35	9 34		
8 30	2 30			Ar *Moberly, Mo.*	Lv	1 17	6 45		
8 35	2 40	1 45	8 30	Lv ***Moberly, Mo.**	MTL Ar	11 12	6 45	8 35	
		1 58	8 43	Huntsville	ss			8 22	
		2 07	8 52	Clifton Hill Jct.	hs			8 14	
		2 17	9 02	*Salisbury				8 04	
		2 30	9 15	*Keytesville				7 53	
Via Columbia Ar 9 35 Lv 9 35	Via Columbia Ar 3 46 Lv 4 15	2 45	9 30	*Brunswick		Via Columbia Ar 9 10 Lv 10 12	Via Columbia Ar 2 45 Lv 5 50	7 40	
		2 56	9 41	De Witt				7 30	
		3 09	9 54	Leta Jct.	f			f	
		3 20	10 05	Ar ***Carrollton**	Lv			7 12	
		3 25	10 10	Lv ***Carrollton**	Ar			7 09	
		3 38	10 23	*Norborne	ss			6 54	
		3 52	10 37	Hardin	hs			6 41	
		4 02	10 47	δRichmond				6 30	
		4 16	11 01	Elkhorn	f			f	
		4 25	11 10	*Excelsior Springs				6 10	
		4 40	11 25	Liberty Jct. (69 & 33)	f			5 53	
		5 04	11 49	North Kansas City				5 35	
				Kansas City, Mo.					
		5 15	12 01	Ar* CTS Terminal	Lv			5 25	
g12 50	g7 30	5 20	12 06	Ar* GL Terminal	Lv	g6 15	g11 00	5 15	
g3 00		c5 45	c1 30	Lv *Kansas City, Mo.*	CTS Ar	g4 50		g4 35	
g4 45		c7 40	c3 25	*Topeka, Kans.* (8423)		g3 05		g2 50	
		c10 40	c6 30	Ar *Wichita, Kans.*	CTS Lv				
	g1 00	c5 45	c12 50	Lv *Kansas City, Mo.*	CTS-GL Ar				
g6 00	g4 05	c8 59	c3 50	*Manhattan, Kans.* (8362-572)		g1 50		g1 30	
g7 05	g4 40	c9 45	c4 25	*Junction City*		g1 15		g12 25	
g9 05	g5 55	c11 00	c5 45	*Salina, Kans.*		g11 45		g11 10	
g7 10		c10 00		Ar *Denver, Colo.*	CTS-GL Lv	g11 45		g11 30	
	g7 30	c6 15	g12 45	Lv *Kansas City, Mo.*	CTS Ar	g5 25			c5 15
	g8 50	c7 25	g1 55	*St. Joseph, Mo.*		g4 15			c3 35
	g12 55	c11 45	g5 55	Ar *Omaha, Neb.*	CTS Lv	g12 50			c10 30

All trips operate daily unless otherwise noted.
AM—Light Face. **PM—Bold Face.**
Times shown in ITALICS indicate service via connecting trip or trips.

EXPLANATION OF REFERENCE MARKS

CTS or c—Continental Trailways.
GL or g— Greyhound Lines, Inc.
JL—Jefferson Lines.

MTL—MISSOURI TRANSIT.
SHS—Scenic Hawkeye Stages.
SH or ‡—Sunday and Holidays ONLY.
*—Full Service Terminal.
LB—Lock Box for deposit of express after hours.

#—Meal stop or rest stop.
f—Flag stop.
hs—Highway stop.
D—Goes into town to discharge only.
ss—Station stop. ° or Dly—Daily.
ESH or °—Except Sundays and Holidays.

§ or Sun—Sundays only.
δ—Checked baggage, prepaid and collect express—No C.O.D.
ah-Sun—When Holiday falls on Monday-Schedule will operate Monday in place of Sunday.

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2. If you missed your bus, what would be the earliest you could get to Kansas City?

3. How many buslines are listed here?

4. Since this is a short trip, what symbol in the list of reference mark does not apply?

5. How long would it take to get from Carrollton to Excelsior Springs in the afternoon?

6. Considering the information in the middle panel, why is it a good idea to skim the whole schedule first? (Write the information.)

7. What do towns like Salisbury, Keysville, and Brunswick have in common?

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8. If you were to take the earliest bus on the return, about how long would you be away from home?

9. Carrollton is in boldface. What does this apparently indicate?

10. What is the meaning of via Columbia?

11. Go back now to your Thinking to Learn Process Chart. Which questions on the chart apply to the exercise? List them.

APPLY IT

Obtain a blue print or shop drawing from another department in your plant. Instead of going about reading it as you might otherwise do, follow the test procedure you just completed. First, write a little scenario of your own (this is good!), then prepare at least three questions on it which you then skim for answers.

EXPLAIN IT

Describe exactly how locating information is different from what might be called regular reading. Name two advantages in knowing in advance that locating only a little information from a large amount is your purpose for reading.

Lesson 2 Outcomes

The student will be able to:

1. **Define skimming for locating information.**

2. **Distinguish between reading for a limited amount of exact information and regular reading for full understanding.**

3. **Choose the questions in the Thinking to Learn Process chart that apply to this type of reading.**

4. **Identify the specific purpose for reading only to locate information.**

5. **Note the emphasis on speedy and efficient reading.**

6. **Determine if this reading task is at independent, instructional, or frustration level.**

WORKSHEET 2

READING AT WORK

Shop Reading Applications
Main Ideas - Details

OBJECTIVE: **Identify main ideas and important details in shop reading.**

PURPOSE: **Read for understanding as well as information.**

PROCEDURE: **Read the material as a whole and as distinct parts. Refer to the attached electrical code.**

TRY IT

Scenario

Your responsibility on this job is to be informed about electrical regulations to the extent that you can inspect, advise, and interpret on all questions concerning them. This clearly extends beyond information to understanding. You realized that reading to see the "big picture" is important here.

First skim the whole sample noting major headings and divisions. This previewing or sizing up is helpful in reading for understanding because it avoids the fragmentation that occurs when reading only for specific information.

1. **Article 349 is part of a larger work. Name it.**

ARTICLE 349 — FLEXIBLE METALLIC TUBING

A. General

349-1. Scope. The provisions of this article apply to a raceway for electric conductors which is circular in cross section, flexible, metallic, and liquidtight without a nonmetallic jacket.

349-2. Other Articles. Installations of flexible metallic tubing shall comply with the provisions of the applicable sections of Article 300 and Section 110-21.

349-3. Uses Permitted. Flexible metallic tubing shall be permitted to be used (1) in dry locations; (2) in accessible locations when protected from physical damage or concealed such as above suspended ceilings; (3) for 1000 volts maximum; and (4) in branch circuits.

349-4. Uses Not Permitted. Flexible metallic tubing shall not be used: (1) in hoistways; (2) in storage battery rooms; (3) in hazardous (classified) locations unless otherwise permitted under other articles in this Code; (4) underground for direct earth burial, or embedded in poured concrete or aggregate; (5) where subject to physical damage; and (6) in lengths over 6 feet (1.83 m).

B. Construction and Installation

349-10. Size.

(a) Minimum. Flexible metallic tubing smaller than ½-inch electrical trade size shall not be used.

Exception No. 1: ⅜-inch trade size shall be permitted to be installed in accordance with Section 300-22(b) and (c).

Exception No. 2: ⅜-inch trade size shall be permitted in lengths not in excess of 6 feet (1.83 m) as part of an approved assembly or for lighting fixtures. See Section 410-67(c).

(b) Maximum. The maximum size of flexible metallic tubing shall be the ¾-inch trade size.

349-12. Number of Conductors.

(a) ½-Inch and ¾-Inch Flexible Metallic Tubing. The number of conductors permitted in ½-inch and ¾-inch trade sizes of flexible metallic tubing shall not exceed the percentage of fill specified in Table 1, Chapter 9.

(b) ⅜-Inch Flexible Metallic Tubing. The number of conductors permitted in ⅜-inch trade size flexible metallic tubing shall not exceed that permitted in Table 350-3.

(FPN) For conductor cross-sectional area see Tables 5, 5A, 6, 8 and the applicable Notes to Tables at the beginning of Chapter 9.

349-16. Grounding. See Section 250-91(b), Exception No. 1.

349-18. Fittings. Flexible metallic tubing shall be used only with approved terminal fittings. Fittings shall effectively close any openings in the connection.

(FPN) See Sections 300-22(b) and (c) for use in ducts, plenums, and other spaces used for environmental air.

349-20. Bends.

(a) Infrequent Flexing Use. Where the flexible metallic tubing shall be infrequently flexed in service after installation, the radii of bends measured to the inside of the bend shall not be less than specified in Table 349-20(a).

Table 349-20(a). Minimum Radii for Flexing Use

Trade Size	Minimum Radii
⅜ inch	10 inches
½ inch	12½ inches
¾ inch	17½ inches

For SI units: (Radii) one inch = 25.4 millimeters

(b) Fixed Bends. Where the flexible metallic tubing is bent for installation purposes and is not flexed or bent as required by use after installation, the radii of bends measured to the inside of the bend shall not be less than specified in Table 349-20(b).

Table 349-20(b). Minimum Radii for Fixed Bends

Trade Size	Minimum Radii
⅜ inch	3½ inches
½ inch	4 inches
¾ inch	5 inches

For SI units: (Radii) one inch = 25.4 millimeters

ARTICLE 350 — FLEXIBLE METAL CONDUIT

350-1. Other Articles. Installations of flexible metal conduit shall comply with the applicable provisions of Article 300.

350-2. Uses Not Permitted. Flexible metal conduit shall not be used: (1) in wet locations unless conductors are of lead-covered type or of other types approved for the specific conditions and the installation is such that water is not likely to enter other raceways or enclosures to which the conduit is connected; (2) in hoistways, other than provided in Section 620-21; (3) in storage-battery rooms; (4) in any hazardous (classified) location other than permitted in Sections 501-4(b) and 504-20; (5) where rubber-covered conductors are exposed to oil, gasoline, or other materials having a deteriorating effect on rubber; nor (6) underground or embedded in poured concrete or aggregate.

350-3. Minimum Size. Flexible metal conduit less than ½-inch electrical trade size shall not be used.

Exception No. 1: For underplaster extensions as permitted in Section 344-2.

From National Electrical Code (c) 1990
National Fire Protectional Association, Quincy, MA

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2. Scan to identify the number of major headings.

3. All paragraphs are about something, commonly called main ideas, although they are not always stated, but may be only suggested or implied. Write in one sentence the main idea of paragraph 349-4.

4. Main ideas must be supported in some form using examples, facts, and the like, resulting in a paragraph. What are the details for paragraph 349-20?

5. Paragraphs may be referred to as "units of meaning". Using paragraph 349-4 for a reference, describe how this definition applies.

6. Paragraph 349-1 is headed "Scope". What kind of information can you expect here?

7. A reader should notice that this sample is divided into two major parts. Write the main idea for each of them.

8. Define plenum, radii, aggregate, accessible, embedded.

9. Interpret for a new worker the meaning of paragraph 349-20(b), the main idea.

10. Finally write in one sentence the main idea of the whole sample.

APPLY IT

1. If reading is defined as point A (knowing little or nothing of a subject) and reading point B (a measure of information and understanding has been gained), summarize in a paragraph the extent to which you think you approached point B.

2. Judge whether this reading is at your independent level.

3. Although each paragraph in a reading passage has its own main idea (stated or implied) the passage as a whole has its main idea also, including book length. When you stated the main idea in item ten of the exercise, you demonstrated your ability to pull together several main ideas (each paragraph) into one concept. This is called synthesis and it is a key to understanding as opposed to getting only information, whether on the job or in general reading.

4. Demonstrate once more your ability to identify the main idea by reference to the paragraph above.

5. Write a paragraph instructing a new employee in your department on a specific procedure. Is the main idea clear?

EXPLAIN IT

1. Review the sample reading on electrical codes and explain to what extent our definition of reading is helpful for good comprehension of it.

2. Discuss the practical application of thinking of paragraphs as units of meaning in shop reading.

3. Indicate your perception of this statement: "Main ideas transmit understanding in reading; the supporting details, examples, or facts provide information."

Lesson 4 Outcomes

The student will be able to:

1. Define reading, with particular on-the-job applications.
2. Identify the nature and function of paragraphs.
3. Locate main ideas of paragraphs.
4. Recognize various supports for main ideas.
5. Synthesize the main idea for long passages.
6. Indicate applications of these skills to job requirements.

READING SKILLS
PART A - LESSON 3
LOCATING INFORMATION 2

OBJECTIVE: Efficiently find specific information in shop specifications and drawings.

PURPOSE: Accurately determine exact information needed to get the job done right the first time.

PROCEDURE: Use the sample shop reference check for each item in your Thinking to Learn Process Chart.

TRY IT

SCENARIO

Joe and Mary came to work this morning and were given their instructions for their first job of the day, not by any spoken directions from the boss, but only a sheet indicating in detail the work to be done. They see that it includes a drawing as well as instructions written in words, but not in everyday English. Will our workers be able to carry through? Can they do what is required independently, or will they request help (instructional)? Think of one circumstance that might cause this task to be at a frustration level.

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APPLY IT

1. Check your Thinking to Learn Process chart again. Do any additional questions under "Questions to Explore" seem to apply now that did not at first?

2. Decide if this material right at the moment is independent, instructional or frustration level for you.

3. You might agree that the ten questions we asked were relatively less difficult than they could have been. Go back to the sheet and prepare what you consider a harder question.

4. Quick, efficient reading of shop material requires, among others, skill in skimming and scanning. Go back to the sheet and demonstrate the difference.

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5. Compare the "shop talk" in this sample with your own.

EXPLAIN IT

1. In specific terms, what would be Mary's and Joe's purpose for interpreting these instructions accurately and quickly?

2. Explain active as opposed to passive reading. Describe how following the guide according to the Thinking to Learn Process Chart encourages active reading.

3. Discuss: Reading well according to the Thinking to Learn Process is a matter of attitude toward ourselves and our job.

4. Your "Thinking to Learn" chart has a "Focusing" component. Discuss what focusing means in terms of reading a shop sheet.

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OUTCOMES

The student will be able to:

1. Define skimming and scanning reading skills for locating information.
2. Compare written instructions with drawings as backups.
3. Visualize the completed product.
4. Apply applicable principles of the "Thinking and Learning Process".

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GATEWAY SKILLS
WRITING AT WORK

Lesson 7

The student will be able to:

1. **Write a clearly organized unit with a specific purpose in mind.**

2. **Target one main point that is logical and complete.**

3. **Write a set of instructions that demonstrates positive tone and keeps the audience in focus.**

4. **Write to a specific audience with a select set of terms.**

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THE THINKING TO LEARN PROCESS
WRITING AT WORK

We write for many reasons. Two of the main reasons we write on the job is (1) to share information and (2) to solve problems.

Consider this scenario

> *Max works second shift. He has noticed something is wrong with his machine. He has asked maintenance to repair it. His shift is ending and the machine is still not fixed. He needs to leave a note for the operator on the next shift. He does not want to appear as though he did something wrong. At the same time, he is concerned that the next operator not feel like he is telling him or her what to do.*

In your own words, write the message for Max here.

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Good Writing is FOCUSED, PURPOSEFUL, AND ORGANIZED

Max can make his message clear by FOCUSING ON ONE IDEA. This is called UNITY.

Answer these questions.

1. What is the main idea? Is it general or specific?

Practice writing main ideas here.

We write for 2 reasons at work.

1. We write to share and explain information.
2. We write to solve a problem.

Writing to Share and Explain Information

Writing is a thinking tool.

What is a list of the ideas Max should include in his message?

2. List those ideas here.

3. Who is the audience? Who should Max write his message to? Should anyone other than the next shift operator get a copy of Max's message?

Write here who should get a copy of Max's message?

4. Write here the needs Max needs to fulfill to convey his meaning to the audience he has targeted.

5. What are the ideas Max should include? Remember: what is the purpose Max is writing?

6. Organize the ideas for Max's message. What goes first, second, third, fourth, and last.

7. How specific should Max get? Would it be better to be broad and general or thorough and specific? Explain why or why not.

What about specific support statements that explain and clarify the main point. THIS IS CALLED COHERENCE. ALL IDEAS ARE LOGICALLY ORGANIZED AND RELATE TO THE MAIN POINT.

8. Practice writing specific support statements here.

TRY IT

1. Define unity.

2. How does coherence help keep writing clear?

APPLY IT

1. Clear, effective writing starts with a general statement and moves to specific support statements. Explain why this makes the writing clear and effective.

EXPLAIN IT

In class, write your own ideas for Max's message. (5 minutes)

Group think as a group, create a 2-5 paragraph message for Max to leave for the next operator.

THE THINKING TO LEARN PROCESS

Writing	Questions to Explore
Select the audience (Be active)	Who am I writing to? What are his/her needs? How can I make the message clear?
Collect the facts (Be assertive)	Am I asking the right questions? Am I collecting good, useful information?
Analyze the facts (Be critical)	Am I seeking to understand? Am I being influenced by elements that are not logical? Are emotions clouding my judgement?
Select the message	What is my purpose? What idea do I wish to communicate? To share information? To solve a problem?
Write organized ideas that are focused, logical and complete.	Have I chosen to develop ideas completely? Are they unified, coherent and complete?
Check for effective idea development and avoid barriers to effective communication.	Are my sentences complete? Did I use words that convey the meaning I want to communicate? Have I checked for correct spelling, usage and grammar?
Check your attitude	Is my message focused on the issue? Is it polite and professional with positive tone?

WRITING SKILLS
LESSON 1 - FILLING OUT REQUESTS

OBJECTIVE: Alert employees to request writing.

PURPOSE: Provide opportunities for employees to practice effective form writing.

PROCEDURE: Use actual forms for writing simulated requests after introductory discussion.

TRY IT

SCENARIO

Something went wrong with the machine Joann was working with yesterday. Everything seemed to be doing well until after about an hour the indicators showed that her product was failing to meet the specifications. An experienced employee, Joann made several adjustments but they did not correct the problem. This was a serious situation because sale of the product depended on delivery by a specified date. Delay could mean cancellation, so Joann had to make a quick decision. Shop rules required machine operators to write repair requests on their own.

1. Joann obtained a standard form for requesting maintenance work, but she became flustered when she began to write, for plant policy required very specific information. She wrote:

> *"I don't remember exactly when it started, but I first heard a kind of crackling noise or maybe a kind of boom or whistle. I don't know which. All the gauges seemed to be all right when I first looked, but the second time gauge number 3 was wrong, I think, but maybe it was number 6. I don't remember exactly. Anyhow I could tell something was out of whack because one day a friend of mine told me she had worked on this same machine but it was a different kind of problem. To tell the truth I don't like working this machine. One thing I know for sure is that I was going to wind up with a lot of scrap because the machine just wasn't working right. Also I'm very sure it wasn't because of anything. I did wrong because I'm always careful in everything I do. I've had bad luck in this department before. But then I checked the gauges again. I saw it really was gauge number three that was off, so I had a pretty good idea what the problem was. I knew right away that the temperature was too low for this batch and that was what was causing the problem."*

Let's check this maintenance request:

1. We are told there is a problem - much too vague and general.
2. She states the obvious. Of course there is a problem.
3. Noises can often help pinpoint a trouble spot. Joann's failure to specify the noise is a hindrance.
4. Her misreading of the gauges is hard to justify, but in any case should have been mentioned at the beginning.
5. The story about her friend's experience is irrelevant.

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6. Expressions like "out of whack" don't belong in a critical situation.

7. Her disliking the machine is irrelevant.

8. The comment about winding up with lot of scrap is again stating the obvious.

9. Joann's remarks about being careful and just bad luck clearly are out of place here.

10. She had no clear point in mind and therefore did not make one.

Let's summarize:

> *This report is really contained in the last three sentences. Joann just took a round about way getting there. Otherwise it lacks specifics, contains personal remarks, and appears to be merely random jottings. If this report had not been partly rescued near the end, it would not be very helpful. From this we can determine some rules for shop writing:*
>
> A. Think through the problem making a rough list of exactly what you observe.
>
> B. Check all gauges and other indicators more than once and write down the readings.
>
> C. Avoid any digressions. Write your request or report only after you have as clear information as possible.
>
> D. Include personal opinions only if they are based on experience and are directly related to the purpose of the request or report.

E. Beware of vagueness. Use shop talk in its proper context.

F. Shakespeare said, "Brevity is the soul of wit." Make it brief.

APPLY IT

1. **Put yourself in Joann's place. Reread the report and the analysis of it. Then read again the suggestions for improving it.**

2. **Now you are ready to rewrite Joann's report. After you have finished, check the analysis and suggestions against your version. Are you fairly certain you have improved the original?**

3. **Finally, write your own original.**

Your job today is similar to Joann's. You began your task in the usual way, and like Joann you are experienced and know your work. Before long you realize the project is not going as it should, and after checking the operation it is clear that a malfunction report is necessary.

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4. Write your report now. What is your own evaluation of it?

5. Keep in mind that all writing is for an audience; that is, some particular person or group of persons will read what is written for some purpose. (What will be the reader's purpose here?)

6. Exchange papers with classmates. You can learn by reading their work and they yours.

EXPLAIN IT

1. **Effective writing can be defined as the process the writer uses to make his point clearly and efficiently. Explain Joann's ineffective report in terms of this definition.**

2. **Explain precisely what you did to write a better report than Joann's.**

OUTCOMES

After this lesson the student:

1. Will demonstrate the need to think through a problem before writing a shop memorandum or report.

2. Will recognize specific, concrete, on-the-job language is essential in shop writing.

3. Will recognize that some sort of organizational pattern such as time order, spatial order or enumeration-sequence is very helpful.

4. Will avoid editorializing.

5. Will write appropriately for a specified audience.

6. Will include only points that have a direct relation to the topic.

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WRITING SKILLS
LESSON 2 - THE IMPORTANCE OF TONE IN ON-THE-JOB WRITING

OBJECTIVE: Point to tone as an element in shop writing.

PURPOSE: Learn how to decide upon the most appropriate tone and then to apply it in writing.

PROCEDURE: Practice writing samples illustrating different tones.

Tone refers to attitude in speaking, reading, and writing. For example, we often hear someone say, "It isn't so much what he said, it was his tone of voice I didn't like." When this happens, did the speaker communicate his real meaning effectively? It isn't likely. Actually, the real intent of the speaker's statement could easily be lost by the real or imagined *"tone"* the speaker used.

Many tones are possible. Condescension, anxiety, fear, anger, disappointment, sarcasm, and criticism can be tones on the one hand while humor, tolerance, and praise can be tones in another direction entirely. The question is: what tone is right in a given situation? It depends, not surprisingly, upon the writer's purpose. Finally, two points about tone are essential to writing on the job. Is the tone:

1. Intentional?
2. Unintentional?

Let's see what an example might look like.

SCENARIO

When Jack checked his message box on arriving at work today he found a memorandum which upset him and affected his work. The message read:

To Mr. Doe:

With extreme regret management must take cognizance of the fact that your employment performance evaluations have, for some considerable time, and more especially for the month of July 1993, failed to conform to standards established for your department in a number of areas. One of these areas we wish to particularize is your apparent reluctance to file project reports in a timely and accurate manner, resulting in reworking projects, always disruptive and costly. At the same time the remarks on your reports lack substance, are not germane, and are generally inappropriate. A third cause for concern, we believe, can be summed up as attitude. Sadly, we must express our disappointment that your ranking in this regard is not commensurate with expectations. Your prompt and positive attention to these matters is of prime concern.

For the Department
Harold Fabitz
Manager

Let's look at it.

1. **Note the formal and sometimes elaborate language. What kind of tone does this suggest to you? Is it meant to suggest a tone?**

2. It begins: "Dear Mr. Doe." Does this suggest a tone right away? What kind?

3. Notice the formal language again. Does it present a consistent tone throughout?

4. It ends: "For the Department." What tone does this closing indicate?

5. **What tone is suggested by vague expressions like "generally inappropriate", "lack substance", and "commensurate with expectations"? Are these expressions meant as intentional or unintentional so far as tone is concerned?**

6. **Point out examples of anxiety or optimism if you can find any.**

7. **Jack is a little puzzled about the overall tone of this message. Can you help him?**

In contrast, Jack might have received his message written in a different fashion.

Dear Jack,

Bob and some of the other supervisors in the department have gone over all our people's job ratings for 'the past three months and just yesterday we discussed Jay's report on your work. He has been your supervisor for quite a while and knows how you get things done better than anyone else. For one thing, he noticed how you agreed to work overtime twice last month when we were short handed. Also Jay pointed out that you don't take days off unless you really need to.

One way you could help out is to be sure to get your project reports in right on schedule. Jay would appreciate this because he has so many reports to put together. Both Bob and Jay read your note on the remarks section of your report, and they would like to discuss your concerns soon. We will set a date.

As you know, from your years with us, our company is really interested in the day to day job satisfaction of its employees. Our business depends on it. We want to know if something is troubling you on your job. You will receive a copy of your evaluation within a few days.

Best Regards,

Bob and Jay

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1. Now, do you see the meaning of tone more clearly?

2. Tolerance is one type of tone. Indicate this in the memorandum.

3. Do you think the tone in this second version was unintentional or intentional? How can you tell?

4. Note that no attempt is made for anything positive in memorandum number one. Compare this with the second version.

5. **Which report has an objective tone? A subjective tone?**

6. **What is the overall tone of the second message?**

APPLY IT

1. **Now it is your turn.**

   SCENARIO

   For some time now, your department has not kept pace with other departments. There have been a lot of breakdowns, bad communication, and flareups of temper among the employees. In addition, cooperation with shifts is not what it should be absenteeism is up, increasing overtime isn't popular, and misreading of instructions and blueprints is rising. (You will think of others.)

2. **Your fellow employees have selected you to write a memorandum to each person in your department to draw their attention to the problems and to point out ways to correct them. Write a message which is critical, sarcastic and maybe even moralistic to get those people going!**

3. Write a second version (following our model) in which you change the tone altogether.

4. Exchange papers with your classmates for discussion.

OUTCOMES

After this lesson the students will:

1. Recognize the importance of appropriate tone in shop writing.

2. Distinguish among different kinds of tone such as tolerant, objective, humorous, playful as opposed to critical, subjective, sarcastic, or bitter.

3. Demonstrate how to avoid negative and to achieve positive tone.

DIAMONITE 2000
MIDPOINT EVALUATION FORM

Date: ______________________

1. How many classes have you attended so far?

2. What topics/areas have you learned about that you did not know about before taking this class?

backed

3. What is the purpose of [illegible]

4. Has the class helped you work toward any of your personal goals such as attitude/self esteem?

_________ Yes _________ No

If you answered yes, in what way has the class helped?

-OVER-

5. Have you made every effort to participate and keep an open mind about this course?

_________ Yes _________ No

6. Circle one number in each row across to show how you would rate each item.

Example:

I love country music	**5**	**4**	**3**	**2**	**1**	**I can't stand country music**
HOW WOULD YOU RATE THIS PROGRAM?						
Very interesting to me	5	4	3	2	1	Boring to me
Very useful to me on the job	5	4	3	2	1	Totally useless to me on the job
Much too difficult for me	5	4	3	2	1	Much too easy for me
Very useful to me outside work	5	4	3	2	1	Totally useless to me outside of work
Exactly what I expected	5	4	3	2	1	Not at all what I expected
HOW WOULD YOU RATE THE MATERIALS?						
Hard to learn and confusing for me	5	4	3	2	1	Easy to learn and simple for me

7. Would you recommend this course to a co-worker or friend?

_________ Yes _________ No

8. If you could change anything about this program, what would it be?

Thank you for taking time to help evaluate this course. Your answers will be very useful in trying to make it better.

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DIAMONITE
W.R. Grace
OHIO STATE UNIVERSITY
Agricultural
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MASTERY SKILLS

RELATING AT WORK

DIAMONITE 2000

The abilities to relate to and work with others are among the highest skills employers seek. Each employee should seek to: Understand perceptions, recognize behavior patterns, send and receive clear messages, negotiate differences and resolve conflicts.

This packet is designed to help you explore better ways to work with others on the job.

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MASTERY SKILLS
RELATING AT WORK

Working with Others

The student will be able to:

1. Define perception

2. Explain a reality check

3. Discuss how attitudes help or hurt a work relationship.

4. Discuss how the three behavior patterns of passive, aggressive and assertive effect a work relationship.

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5. Explain how the FOUR steps to sending and receiving clear messages can improve work relations with others.

6. Demonstrate how to apply the Thinking to Learn, Building Relationships at work process.

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MASTERY SKILLS

Competency Precheck

Relating at Work

1. **Our perceptions are information we receive from**
   - a. Our parents
   - b. Our friends
   - c. Ourself
   - d. Our senses
2. **Our attitudes are influenced by**
   - a. Our beliefs
   - b. Our feelings
   - c. Our behavior
   - d. All of the above
   - e. None of the above

3. Aggressive behavior is
   a. Never appropriate
   b. Seeking power
   c. Hostile and angry
   d. All of the above
   e. None of the above
4. Assertive people
   a. Are pushy
   b. State their rights
   c. Let others push them around
   d. Act like martyrs
5. Conflict is harmful
   a. True
   b. False
6. Conflict resolution means
   a. Someone wins
   b. Someone loses
   c. Both a and b
   None of the above

PERCEPTION

The way we receive information from our senses and interpret it in the brain is a process called PERCEPTION.

The way we put together our sensory input can be distorted and not accurate.

Look at the examples presented in class

The way we interpret information is often influenced by the needs, expectations, attitudes, values and beliefs of the receiver.

Once we are aware that what we perceive may not be reality, we can do "reality checks" where we make a strong effort to check for facts and avoid distortion from our own biases.

Once we are aware that we perceive the world in our own way and work to achieve the "truth" or the actual facts, we can establish and keep effective and healthy work relations.

Attitudes and Getting Along with Others at Work

An ATTITUDE is

The way we learn to respond to people and things around us, whether positive or negative, is our ATTITUDE.

Our attitudes are influenced by what we believe, how we feel and how we behave.

Maintaining a positive attitude at work is important to building effective, healthy work relations.

Recognize Behavior Patterns

There are THREE behavior patterns to look at when we consider why people may become frustrated on the job. Frequently, frustration and conflict can arise when what we need to be satisfied does not agree with what another needs to be satisfied.

Three Basic Behavior Types

There are THREE BASIC BEHAVIOR TYPES to be aware of in a discussion of establishing effective, healthy work relationships.

Non-assertive

This pattern of behavior seeks to avoid conflict. Placing others' needs ahead of our own by letting others bully us, make choices for us and take advantage of us are all ways the non-assertive pattern is identified.

Not standing up for our rights or not seeking to satisfy our needs and wants, such as getting necessary information in order to properly perform our job, are examples of non-assertive behavior.

This passive behavior can be harmful because it encourages unwanted behavior from others, prevents things from changing and causes the person to blame others for problems. Often, non-assertive patterns can be seen when people "get back" at others or play the role of a martyr.

Aggressive Behavior

Aggressive behavior seeks to control and have power. This pattern is reflected when the aggressor expresses needs and wants freely but in a harmful, hostile or angry manner which ignores the rights of others.

Assertive Behavior

The goal of assertive behavior is to seek ways to resolve issues which are satisfying and effective. Assertive patterns are direct and respect the rights and dignity of all parties. Usually a compromise which meets the needs of all is the goal.

Discuss Examples in Class

Sending and Receiving Clear, Effective Messages

There are FOUR steps to sending a clear, effective message.

STEP ONE Do your homework

Collect the facts, specific information to be discussed

* Do a reality check

* Ask open-ended questions that seek more information such as, "Tell me more about. . . . ." or "What else should I know about. . . . ."

STEP TWO Describe the problem or situation

a. Do not assume that the receiver will know what you are talking about.

b. Avoid accusing the other person. For example, "You were late again."

c. Focus on the issue, not the person.

STEP THREE State your viewpoint

a. Watch dumping an angry outburst. Wait until you are calm to present a clear and lucid point.

b. Do not deny feelings but, rather, express them in an honest way. For example, "I feel frustrated when work comes to me without explanation."

c. Be direct. State what is needed, wanted and why.

Examples:

The reason I want to discuss this with you is. . . . . .

My major concern is. . . .

STEP FOUR State the change or action you want

a. Be specific

b. Give the facts

c. Give clear reasons why

d. Do not interrupt

e. Allow the other person to speak

USE TRUST BUILDERS

Begin a discussion with others by showing you trust and value their ideas. Practice the examples below:

To clarify	**"What I hear you saying is. . . .**
	"If I follow you, you're saying. . .
To show you understand	**"I think you are saying you feel. . . .**
To negotiate	**"Would you go along with. . . .**
	"What do you think about. . . .
To encourage	**"Tell me more. . . .**
	"Keep going. . . .

TRY IT

1. Define perception.

2. What is a reality check?

APPLY IT

3. How can a negative attitude help or hurt a work relationship? Be specific.

EXPLAIN IT

4. Discuss how the THREE behavior patterns can help or hurt a work relationship. Be specific.

5. How do you think the FOUR steps to sending and receiving clear messages can help you improve your work relationships? Be very specific.

COMMUNICATION WORKSHOP

These exercises are designed to give you the opportunity to practice skills to communicate to get along with and to negotiate with others at work.

Situations described below could be conflict situations.

Scenario Situation 1

Bill works second shift. The person who comes in to replace him on third shift has demanding family responsibilities and constantly comes in late. This person is your friend so you do not want to complain to your superior.

However, the last three days Bill has been late and you have covered for him. You have missed important personal appointments because you are now leaving work later than you should leave.

You have told Bill that you need to leave on time but today he was 20 minutes late.

You should:

1. **Do your homework.** *Do a reality check.* **Are you upset because Bill is late or are you still thinking about the argument you had with your teenage son?**

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2. Review your viewpoint.

   I need to leave work on time because I have important personal engagements to attend.

   Consider other viewpoints?

   For example, you know Bill has pressing family responsibilities.

3. **Follow These Methods to Clear, Effective Messages and Behavior Patterns.**

Describe the Behavior: **I had hoped to clock out when my shift ended and this is the third time in three days I have been late because Bill was not on time.**

State How I Feel: **I feel upset because I have missed important personal engagements and spent my free time at work when I would rather be somewhere else.**

State What I Think is the Issue: **I get the impression that your family responsibilities are making you late. Am I right?**

State my Request: **I would like to know how much longer this is going to continue and if we could arrange a way to notify me when you will be late.**

WHAT YOU SAY TO BILL:

> **When you came in to work 20 minutes late today I realized that I needed to tell you that I am feeling upset because I am missing important personal engagements. This is the third time in three days that I have left work later than planned. I missed some important personal engagements. Can you tell me if you think you will be late tomorrow and is there a way we can work out that you can notify me when you know you will be late?**

Scenario Situation 2

Joe works first shift. He has been coming to work under the influence of alcohol. You are concerned he could hurt himself or others. You value your friendship with him. Recently you read in the paper that he was arrested for DUI. You know he needs your help more than ever. He has come in late four times in the last week.

Talk to him.

Review your viewpoint.

Consider other viewpoints.

1. **Describe the behavior.**

2. State how I feel.

3. State what I think is the issue.

4. State my request.

5. What I say to Joe:

THINKING TO LEARN
RELATING AT WORK

Relating at Work The Process	Questions to Explore
Focus on the Challenge	What is the issue? The problem? The situation?
Collect the Facts	Have I checked out the facts?
Analyze the Facts	What are the pros? What are the cons? What are the consequences?
Describe the situation	Is my viewpoint clear? Complete?
Review your action request	Do I know what I want? Need?
Check your attitude	Am I assertive? Fair? Respectful of myself and others?

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CONFLICT RESOLUTION

- **CREATIVE PROBLEM-SOLVING**
- **CONFLICT MANAGEMENT**
- **CONFLICT RESOLUTION**

... no perfect answer

... no perfect one way solution

... people are human

... there is little new information, just ways to look at old information in a new way, recast it, reconfigure it

How we perceive what we see makes all the difference

Life is full of conflict, it is everywhere, it is a part of life

We give our children a gift when we teach them to manage conflict in their lives

EXERCISE

Give a word that describes "Conflict" to you

Analyze the words, are they positive or negative?

Point 1...Learn to recast our thoughts, balance our thinking

Positive Aspects to Conflict

Growth

Compromise

Agreement

Solution

Peace

Understanding

Awareness

Closure

Adapted from: Patricia Williams, University Ombudservices, OSU 1992

***** Demystify the emotion and see conflict as an opportunity for understanding, and a vehicle for constructive change

***** DIFFICULT TO DO

Society does not teach us nor provide us with the tools for conflict management or resolution

"Where would we expect to find conflict?"

HOME	WORK	EVERYWHERE

DEFINITION

Conflict Management: a system by which one can acknowledge and address disputes in a fair and reasonable manner

Developing a system is time consuming: we need to practice to develop the talent to see conflict as a growth process

We all have emotions and they are not bad; they just ARE

Conflict Resolution: Means by which one settles a dispute and goes on from there

Problem-solving:
* identify the problem (see handout)
* identify your goals and values
* look at the parts

Look at the parts and think of conflict as along the line of a continuum of problem-solving

Each part of the process of conflict resolution has a phase, a part of a larger continuum

DOES NOT HAVE TO BE NEGATIVE

Part 1	Engagement:	The event
Part 2	Interaction:	What is said and done
Part 3	Escalation:	Blow-up
Part 4	Fall-out:	The aftermath

Before we get to the positive, work through the negative

Look at the ramifications and implications of UNRESOLVED CONFLICT:

... emotional toll

... financial toll

... stress, pain

Conflict unresolved needs intervention

ENGAGEMENT

... Consider how each party reacts to conflict

... Consider the goal, the mission, what each party wants from the other

... What is the problem, the issue (both on the surface and hidden)

... What kind of past, history, baggage is brought along for the trip

INTERACTION

... What is the ENVIRONMENT--People respond differently in groups than they do one on one

... The key here is EACH PARTY LOOKING INTO SELF

ESCALATION

... What is the value, the importance of the relationship

... Is there meaning or little meaning

... What was factual? clear, cold, objective

... What was emotional?

... What was said?

... What was heard?

... How was it said?

... How did you respond?

... Use the "count to 10" rule?

What is the trigger?

---word

---action

---nonverbal

STOP AND THINK--WHAT PUSHES MY BUTTON

Motivation for Conflict

a. *** A change--especially hard if we feel we have no say so, little input

Remember: change is perceived as a loss

b. racial/ethnic-elitist attitude

in this culture we are not trained to deal with differences among people in a positive way: we see differences in some instances as threats, as wrong, as taking away our control

c. cultural clash

d. gender differences: men and women think differently our culture does not value intuition which is a way most women think

e. economic competition

f. moral, ethical values

g. human factor

h. right brain, left brain dominance-impacts on communication style

right-conceptual, see the big picture

left-linear, detail oriented

All of the above can work together; they are not mutually exclusive

3 types of conflict

1. interpersonal - one-on-one
2. person to institution
3. person within the organization

Remember: we all make a choice to contribute to escalation or to de-escalate

A. interpersonal - I don't get along with a colleague

B. person to institution - disagree with a rule must enforce it with subordinates, creates conflict

C. person within organization - not a good fit, too many areas of divergence

We all need to look at our buttons, triggers and take responsibility for our actions to CHOOSE to engage or TO GET OFF THE ESCALATOR

We must:

1. look inside ourself
2. learn from watching and seeing ourself
3. choose to see and reason
4. take control of ourself
5. self-direct, think of both parties

DEAL WITH THE CONFLICT, THE ISSUE, THE BEHAVIOR, NOT BE IN CONFLICT WITH EACH OTHER

WHEN ALL ELSE FAILS, SEEK MEDIATION

Be honest with the mediator, since the problem is the underlying issues, the feelings not being spoken

TECHNIQUES WE CAN ALL LEARN BUT HAVE TO PRACTICE TO GET

1. Change our vocabulary, our way of speaking and thinking about conflict

   Reframe the question, instead of using trigger words

2. Begin being fair, this is not adversarial, not choose sides and not drag others into it that have no need to be in the picture

3. Noncombative - watch words, tone, body language

4. Use neutral wording, maybe need "cool off" period to speak rationally and without emotional triggers

5. Say, "Help me understand what is our objective and what is important to you"

6. Phrase the statements back to the other party until the other party says that what you heard is what they meant: remember: the other party is the one who decides if you got it, not you

Conflict resolution is an art, a process, it is NOT

a WIN/LOSE PROPOSITION - NO ONE WINS THIS ENGAGEMENT

Nothing works all the time

We need to weigh the outcome, weigh the loss versus gain

It is an on-going process

Sometimes we need objective by-standers since we lose credibility with those closest to us

We can only be responsible for ourselves; we need to redirect our thinking to change how we feel about engaging with others, then demonstrate we are willing to change behavior and we will begin to see others behaving differently toward us

Diamonite 2000

Mathematics Instruction
for
Hourly Employees

© 1994
Emil E. Miller, Jr.
Ohio State University
Agricultural Technical Institute
Wooster, Ohio

Diamonite 2000

Math Instruction for Hourly Employees

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The materials outlined in this manual were taught in five (5) two-hour class sessions, for a total of ten (10) hours of instruction.

Class 1 - 2 hours of instruction and guided practice

Pages six through ten of the manual were used as reference as the instructor reviewed operations with fractions and decimals. Problems one through five on page 15 of the manual were assigned for practice.

Objectives for class 1:

The student will be able to...

- Solve basic fraction problems involving addition, subtraction, multiplication or division of fractions or mixed numbers.
- Convert between the fraction notation and the decimal notation of a number.
- Solve basic decimal problems involving addition, subtraction, multiplication or division of two numbers.
- State the minimum and maximum allowable values when given a measurement with a tolerance stated in terms of a fraction or a decimal.

Class 2 - 2 hours of instruction and guided practice

Pages 11 through 14 of the manual were used as reference as the instructor reviewed operations and application problems involving percent numbers. Problems six through ten on page 15 of the manual were assigned for practice.

Pages 19 through 23 of the manual were used as reference as the instructor reviewed angle measurement and area for plane figures. Eight models marked A through H were measured by the students, and their areas were calculated. Models were made of plastic and represented basic 2-D figures. Page 25 of the manual was assigned for practice.

Objectives for class 2:

The student will be able to...

- Find a percent of a number.
- Increase or decrease a value by a given percent.
- State the minimum and maximum allowable values when given a measurement with a tolerance stated in terms of a percent.
- Solve application problems involving percent of a whole, percent increase, or percent decrease.
- Find the area of a standard 2-D figure.

Class 3 - 2 hours of instruction and guided practice

Pages 26 through 28 of the manual were used as reference as the instructor reviewed volume for space figures. Twelve models marked AA through LL were measured by the students, and their volumes were calculated. Models were made of plastic and represented basic 3-D figures. Page 30 of the manual was assigned for practice.

Units of measure from the Metric System and the United States Customary System were outlined and discussed. Pages 31 through 37 were assigned to be read to reinforce understanding of the Metric System.

Objectives for class 3:

The student will be able to...

- Find the volume of a standard 3-D figure.
- Discuss units of measure in the United States Customary System.
- Discuss units of measure in the Metric System.

Class 4 - 2 hours of instruction and guided practice

Conversion from one unit of measure to another was discussed using the process usually referred to as "Unit Analysis". The conversion factors on pages 38 and 39 of the manual were reviewed, and used to solve the problem set on page 40.

The instructor reviewed the idea of reading scales on various measuring devices, including rulers, meters and micrometers. Pages 41 through 48 were used as reference.

Objectives for class 4:

The student will be able to...

- Convert from one unit of measure to another.
- Use various devices (including micrometers, rulers, and meters) to make accurate measurements.

Class 5 - 2 hours of instruction and guided practice

Pages 54 through 57 were used as reference in reviewing some basic statistical ideas. Calculations for the mean, median, mode, range and standard deviation were made. The normal curve (page 60) was discussed.

Four lab stations were set up. These included "measuring length", the "voltmeter", "English micrometers" and "metric micrometers". Each student, working with a partner, made measurements and answered questions at each station - see pages 49 through 53 of the manual.

Objectives for class 5:

The student will be able to...

- Explain in basic terms the statistical concepts of mean, standard deviation, and the normal curve.
- Use various devices (including micrometers, rulers, and meters) to make accurate measurements.

CITATIONS

Pages 19 through 22 of the manual were used with permission, and are from

Stopa, Richard J., Basic Skills in Mathematics - Geometry: Lesson sheets in Blackline for Photocopying, Opportunities for Learning, Inc., 1980.

Page 25 and pages 30 through 39 of the manual were used with permission, and are from

Miller, Emil, and Linda Barbu, Basic Mathematics with Applications in Agriculture, OSU/ATI, 1991.

Some diagrams used on pages 41 through 48, and the text on pages 43 and 44 of the manual are from

Carmen, Robert A. and Hal M. Sanders, Mathematics for the Trades - a Guided Approach, John Wiley and Sons, Inc., 1981.

I. COURSE ORGANIZATION

The Diamonite 2000 math instruction for hourly employees will consist of five (5) two-hour class sessions, for a total of 10 hours of instruction.

II. COURSE DESCRIPTION

The course will include a review of arithmetic, percents, and basic geometry. It will also contain a brief overview of statistics. The concept of measurement will be emphasized with background information, techniques for converting units, and practical hands-on use of various measuring devices.

III. COURSE OBJECTIVES

The student will be able to:

A. Apply reviewed strategies to solve basic fraction and decimal calculation problems, including conversions between fractions and decimals.
B. Solve percent problems involving an increase, a decrease, or a part of a whole.
C. Explain in basic terms the statistical concepts of mean, standard deviation, and the normal curve.
D. Find the area of standard 2-D figures, or the volume of standard 3-D figures.
E. Work with units of measure to convert from one unit of measure to another.
F. Use various devices (including micrometers, rulers, and various meters) to make accurate measurements.

IV. COURSE CONTENT

A. Arithmetic Review
    1. Fractions
    2. Decimals
    3. Percents
B. Basic Geometry
    1. Overview of angles
    2. Two-dimensional figures
        a. Polygons
        b. Circles
    3. Three-dimensional Figures
        a. Prisms and cylinders
        b. Pyramids and cones
        c. Spheres and hemispheres
C. Measurement
    1. Overview
    2. Converting between units
    3. Reading scales on measuring devices
    4. Measurement Lab
D. Overview of statistics
    1. Organization of data
    2. Measures of central tendency
    3. Measures of dispersion
    4. The normal curve

DIAMONITE 2000

Math Instruction - Hourly
Competency Skills

The student will be able to:

1. Solve basic fraction problems involving addition, subtraction, multiplication or division of fractions or mixed numbers.
2. Convert between the fraction notation and the decimal notation of a number.
3. Solve basic decimal problems involving addition, subtraction, multiplication or division of two numbers.
4. Find a percent of a number.
5. Increase or decrease a value by a given percent.
6. State the minimum and maximum allowable values when given a measurement with a tolerance stated in terms of fractions, decimals, or percents.
7. Solve application problems involving percent of a whole, percent increase, or percent decrease.
8. Explain in basic terms the statistical concepts of mean, standard deviation, and the normal curve.
9. Find the area of a standard 2-D figure.
10. Find the volume of a standard 3-D figure.
11. Convert from one unit of measure to another.
12. Use various devices (including micrometers, rulers, and meters) to make accurate measurements.

DIAMONITE 2000
MATH PRETEST

The following problems represent a pretest to see what math skills you possess coming into training. You may use a calculator.

Do the best that you can in answering the problems with the knowledge that you currently possess - do not get help from other people to do these problems, or try to learn these procedures in order to do the problems.

We will have a similar test at the end of training to determine the effectiveness of the training, and the amount of material that you have retained.

Thank you for your cooperation.

Good luck!

1. $\frac{7}{8} + \frac{1}{4} + \frac{11}{16} =$

2. Change $\frac{3}{16}$ to its decimal equivalent.

3. The allowable length of a part is marked as 1.322 ± .005 inches. What are the **minimum and maximum** allowable lengths for this part?

4. Of 2250 ceramic parts produced this morning, 6.4% were defective, how many parts were defective?

5. Of the 81 parts produced on third shift in E & S on 5/21/93, 6 were outside the tolerance range and had to be reworked. What percent of the parts needed to be reworked?

6. The allowable length (inches) of a part is marked as 5.300 $^{+\,2\%}_{-\,3\%}$
What are the **minimum and maximum** allowable lengths for this part?

7. The median of the numbers 15, 20, 8, 7, and 10 is
a. 10
b. 8
c. 12
d. 15

8. Two measures of dispersion are
a. the mean and the mode
b. the range and the standard deviation
c. the median and the range
d. the mean and the mean deviation.

9. In a normal curve, about what percent of the values are within one standard deviation of the mean?
a. 50.0%
b. 68.3%
c. 95.4%
d. 99.7%

10. The area of a rectangle measuring 3 ft by 5 inches is (show work)
a. 15 ft^2
b. 180 in
c. 1.25 ft^2
d. 20 ft^2

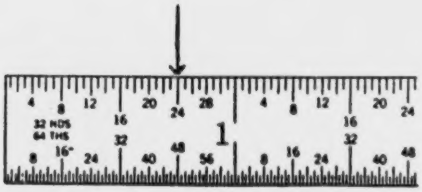
11. The metric prefixes meaning 1000, 1/100, and 1/1000 are
a. mega, hecto, and centi
b. kilo, hecto, and deka
c. deci, centi, and milli
d. kilo, centi, and milli

12. Given V = Ah, where A = 26 in^2 and h = 5.0 in, then V is
    a. 130 in^3
    b. 5.2 in
    c. 5.2 liters
    d. 130 in^2

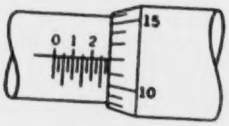
13. If 90 ft/min is changed to inches/sec, the result is (show work)
    a. 90 inches/sec
    b. 1.5 inches/sec
    c. 1080 inches/sec
    d. 18 inches/sec

Read each of the following:

14. ____________________


4
8
12
16
20
24
28
32 NDS
64 THS
32
1
4
8
12
16
20
24
8
16
24
40
48
56
8
16
24
32
40
48

15. ___1.________ inches (1 to 2 micrometer)



FRACTIONS

A FRACTION can represent one of three concepts.

Consider the fraction $\frac{7}{8}$.

This fraction could represent:

1) 7 objects from a total of 8 objects (if eight items are inspected, and seven are approved, then 7/8 of the items are approved)

2) 7 parts of something that has been divided into 8 parts (if a pizza is cut into eight equal pieces, and seven of the pieces are eaten, then 7/8 of the pizza was eaten)

3) the division problem 7 ÷ 8.

DEFINITIONS

A **fraction** represents a quotient of two whole numbers,
OR a part of a whole,
OR a part of a group.

The top number in a fraction is called the **numerator**.

The bottom number in a fraction is called the **denominator**.

A **proper fraction** is one in which the numerator is smaller than the denominator. Examples: $\frac{7}{8}$, $\frac{12}{24}$, $\frac{5}{11}$.

An **improper fraction** is one in which the numerator is greater than or equal to the denominator. Examples: $\frac{8}{7}$, $\frac{16}{16}$, $\frac{15}{1}$, $\frac{5}{2}$.

A **mixed number** is the sum of a whole number and a proper fraction. Examples: $2\frac{3}{10}$, $5\frac{1}{2}$, $7\frac{13}{17}$.

NOTE: A proper fraction represents a value less than 1.

NOTE: Both improper fractions and mixed numbers represent values greater than 1, and so the two formats are interchangeable.

$\frac{35}{11} =$ $\frac{110}{5} =$ $\frac{102}{25} =$

$1\frac{4}{5} =$ $3\frac{11}{20} =$ $4\frac{9}{25} =$

CARDINAL RULE: If a fraction is multiplied or divided by 1, in any form*, the value of the fraction is unchanged.

*Forms of 1 are: 1, $\frac{1}{1}, \frac{2}{2}, \frac{3}{3}, \frac{4}{4}, \frac{5}{5}, \frac{6}{6}, \frac{7}{7}, \frac{8}{8}$, etc.

Resulting fractions are called **equivalent fractions**.

$$\frac{9}{12} = \frac{18}{24} = \frac{6}{8} = \frac{3}{4} = \frac{24}{32} = \frac{12}{16} = \frac{15}{20} = \frac{27}{36}.$$

A fraction is in lowest terms if there is no whole number greater than 1 which will divide evenly into both the numerator and denominator.

All solutions which are fractions should always be reduced to lowest terms.

$\frac{180}{450} =$

$\frac{180}{432} =$

ADDITION/SUBTRACTION OF FRACTIONS

NOTE: Only like fractions (fractions with the same denominator) can be added or subtracted.

NOTE: If two fractions have different denominators, use the CARDINAL RULE to change to equivalent fractions with the same denominator before adding or subtracting.

NOTE: When adding or subtracting with mixed numbers, work with the whole numbers and fractions separately, borrowing or carrying as needed.

$\frac{21}{32} + \frac{3}{32} =$

$\frac{13}{16} - \frac{11}{16} =$

$\frac{7}{8} + \frac{1}{4} + \frac{11}{16} =$

$\frac{3}{5} - \frac{1}{4} =$

$3\frac{5}{8} + 5\frac{3}{16} =$

$14\frac{15}{32} + 11\frac{3}{4} =$

$5\frac{1}{2} - 1\frac{3}{16} =$

$5\frac{3}{16} - 1\frac{11}{32} =$

MULTIPLICATION OF FRACTIONS

NOTE: Like fractions are not needed when multiplying.

NOTE: Multiply numerators to obtain new numerator, multiply denominators to obtain new denominator.

NOTE: By "cancelling" common factors, we can obtain an answer in lowest terms.

NOTE: Never work with mixed numbers when multiplying. Change these to improper fractions.

$\frac{7}{8} \cdot \frac{4}{5} =$

$\frac{3}{4} \cdot \frac{11}{12} \cdot \frac{8}{55} =$

$3 \cdot \frac{2}{3} \cdot 5 \cdot \frac{11}{25} =$

$3\frac{1}{2} \cdot 5\frac{1}{7} =$

DIVISION OF FRACTIONS

NOTE: To obtain the reciprocal of a fraction, invert the fraction so that the numerator becomes the denominator, and visa-verse.

NOTE: Change division by a fraction to multiplication by that fraction's reciprocal.

NOTE: Never work with mixed numbers when dividing. Change these to improper fractions.

$\frac{21}{32} \div \frac{7}{8} =$

$\frac{39}{44} \div \frac{3}{4} =$

$7 \div \frac{2}{3} =$

$\frac{7}{8} \div 7 =$

$3\frac{1}{2} \div \frac{7}{4} =$

$2\frac{2}{3} \div 1\frac{3}{4} =$

DECIMALS ⟷ FRACTIONS

DECIMALS are *fractions* where the denominator is not written, but understood to be present.

To change a decimal into a fraction, put in the appropriate denominator, and reduce.

Try the following: (remember, a decimal number has a whole number part, a numerator, and an understood denominator)

0.14 =

5.125 =

3.6 =

To change a fraction to a decimal, either (a) change the denominator to 10, 100, etc, or (b) perform the indicated division.

$\frac{3}{8}$ = $\frac{4}{5}$ =

$3\frac{7}{11}$ = $5\frac{4}{9}$ =

TOLERANCE

Often times when measuring, the measurement does not need to be exact, but only within certain limits. This variation from the stated measurement is called the TOLERANCE, and can be stated in several ways.

	MINIMUM LENGTH	MAXIMUM LENGTH
$\frac{3.346\ \text{m}}{3.342\ \text{m}}$		
2.234 m ± .002 m		
6.335 in ± .005 in		
$5\frac{11}{16}$ in ± $\frac{1}{32}$ in		
$3\frac{5}{16}$ in ± $\frac{3}{64}$ in		

OPERATIONS WITH DECIMALS

The best way to make sense of operations with decimal numbers is to remember that decimals **are fractions** - a special type of fraction where the denominator is understood.

By using only denominators of 10, 100, 1000, etc., procedures like finding a common denominator and reducing to lower terms become very easy. **This is the advantage of working with decimal numbers.**

When in doubt, the guidelines below will help you remember what procedures to follow when operating with decimal numbers.

ADDITION AND SUBTRACTION OF DECIMAL NUMBERS

1. Place a decimal point to the right of any whole number.
2. Write the numbers vertically so that all decimal points are lined up.
3. Add or subtract as with whole numbers, ignoring the decimal points.
4. Place the decimal point in the answer directly under the decimal points in the problem.

MULTIPLICATION OF DECIMAL NUMBERS

1. Write the problem in vertical form, and multiply as with whole numbers.
2. Place the decimal point in the answer so that the total number of digits to the right of the point is the same as in the problem. Add zeroes to the left of the answer if needed.

DIVISION OF DECIMAL NUMBERS

1. Write the problem as a long division. By moving the decimal point the same number of places to the right in both numbers, make the divisor a whole number. (The divisor is the number we are dividing by, and will be outside the division box.)
2. Divide as with whole numbers.
3. Place the decimal point in the answer directly above the decimal point in the dividend (number in the division box).

PERCENTS

The word **PER-CENT** means **per 100** or **out of 100**. Since the word **per** implies a division, "per 100" means **÷ 100.**

So: 7% means 7 out of 100, or 7 ÷ 100;

14% means 14 out of 100, or 14 ÷ 100;

3.6% means 3.6 out of 100 or 3.6 ÷ 100.

To change a percent to a decimal or fraction, we will use the idea that per-cent means ÷ 100.

$7\% = \frac{7}{100}$ (fraction) $= 7 \div 100 = 0.07$ (decimal)

$14\% = \frac{14}{100} = \frac{7}{50}$ (fraction) $= 14 \div 100 = 0.14$ (decimal)

$3.6\% = \frac{3.6}{100} = \frac{36}{1000} = \frac{9}{250}$ (fraction) $= 3.6 \div 100 = 0.036$

To change a decimal or a fraction to a percent, we will multiply by 100, and attach a percent sign to the number. (Since a fraction or decimal represents a part of one thing, and a percent represents a part of one hundred things, we multiply by 100)

$0.42 = 0.42(100)\% = 42\%$

$0.047 = 0.047(100)\% = 4.7\%$

$\frac{4}{5} = \frac{4}{5}(100)\% = \frac{400}{5}\% = 80\%$

To interpret information involving percents, use the idea that per-cent means out of each 100.

"In Wayne county, 28% of all children are preschoolers" *means* that 28 out of each 100 children are preschoolers.

"Each week, 15% of Ohioans purchase a lottery ticket" *means* 15 out of each 100 Ohioans buy a ticket.

"25% of the class was absent today" *means* 25 out of each 100 students were absent.

In the above examples, suppose there are 42,350 children in Wayne County, suppose there are 10,200,000 Ohioans, and suppose that there are 40 people in the class. Can we come up with actual numbers from the above percents?

CALCULATING WITH PERCENTS

To find a percent of a given quantity, multiply the decimal equivalent of the percent times the quantity.

28% of 42,350 children = 0.28(42,350) = 11,858 children.

15% of 10,200,000 Ohioans = 0.15(10,200,000) = 1,530,000 Ohioans.

25% of 40 class members = 0.25(40) = 10 students absent.

6% tax on a $234.50 purchase = 6% of $234.50
= 0.06(234.50) = $14.07 tax.

WORKING PROBLEMS INVOLVING PERCENTS

In problems involving percents, including the type listed above, often we can think of the problem as having three parts: the percent number, the amount of (count of) the part of interest, and the total amount (total count).

The following problems fit into this category:

1. Of 350 ceramic parts produced on the 27-33 press this morning, 6% were defective, how many parts were defective?

2. Of the 178 parts produced in E & S for Unison Industries, 11 were outside the tolerance range and had to be reworked. What percent of the parts needed to be reworked?

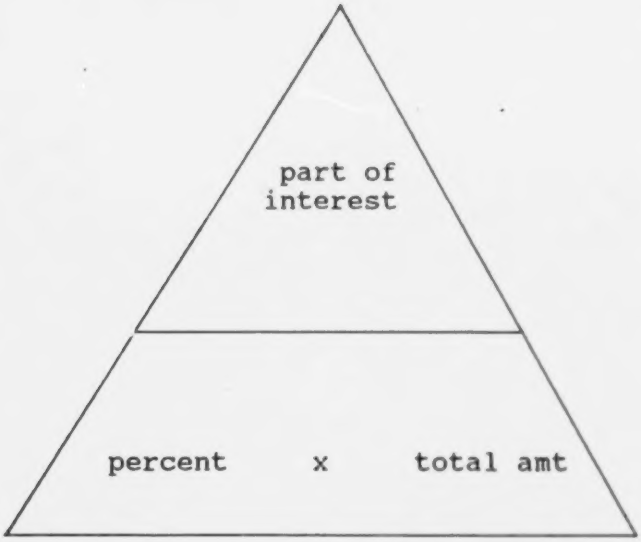
3. It is reported that 3600 parts (number D11836) were produced on third shift, and this represented 12.5% of the total parts of this type produced on 3/16/93. What was the total number of D11836 parts produced on this date?

In the first problem, we are "interested" in the defective parts. The percent defective is 6%, the number of defective parts is unknown, and the total number of parts is 350.

In the second problem, we are "interested" in the parts needing reworking. The percent needing reworked is unknown, the number of parts needing reworked is 11, and the total number of parts is 178.

In the third problem, we are "interested" in the third shift production. The percent from third shift is 12.5%, the number from third shift is 3600 parts, and the total number is unknown.

For each of these problems, we can use the triangle below to help find the unknown value.



Cover up the value you are looking for, and follow the directions given.

For problem 1, cover up the part of interest, and take the % x the total amt = .06 x 350 parts = 21 parts defective.

For problem 2, cover up the %, and take the part of interest ÷ total amt = 11 ÷ 178 = 6.2% need reworked.

For problem 3, cover up the total amt, and take the part of interest ÷ % = 3600 ÷ 0.125 = 28,800 parts.

INCREASING/DECREASING BY A PERCENT

In some situations, we need to increase or decrease a value by a percent.

EXAMPLES: A 20% discount is available on a purchase if payment is made in the first 10 days;

You are to receive a 4% raise;

Production of part D22171 has decreased 8% since last year;

Your property taxes will increase 13% on the next billing.

To calculate a value after a percent change has taken place, take the value before the change, plus (or minus) the percent times the value before the change. That is

BEFORE ± %(BEFORE) = AFTER

A 20% discount is available on a purchase if payment is made in the first 10 days. The bill is for $2540.62. How much should we pay if we pay in the first 10 days?

You are to receive a 4% raise. Your present pay is $9.35 per hour. What will be your new hourly pay?

Production of part D22171 has decreased 8% since last year. Last year 57,250 of these parts were produced. How many are being produced this year?

Your property taxes will increase 13% on the next billing. The last bill was for $511.23. What will be the amount due on the next bill?

PRACTICE PROBLEMS

1. **Add or subtract as indicated:**

a. $\frac{11}{32} + \frac{3}{32} =$

b. $\frac{2}{5} - \frac{1}{4} =$

c. $\frac{3}{8} + \frac{3}{4} + \frac{13}{16} =$

d. $5\frac{1}{2} - 1\frac{11}{16} =$

e. Add 0.3, 13, 5.05, and 22.

f. Subtract 3.5 from 34.67.

g. $4.9 + 0.49 + 94 + 0.8 =$

h. $49 - 0.46 =$

2. **Multiply or divide as indicated:**

a. $\frac{3}{4} \cdot \frac{11}{12} \cdot \frac{8}{55} =$

b. $4\frac{1}{2} \cdot 5\frac{1}{3} =$

c. $\frac{7}{8} \div \frac{3}{4} =$

d. $1\frac{2}{3} \div 1\frac{1}{4} =$

e. $9.4 \times 0.23 =$

f. $0.03 \times 0.07 =$

g. $4.5 \div 0.15 =$

h. $0.00504 \div 5 =$

3. Change the following to decimals:

a. $1\frac{7}{8}$ = b. $\frac{11}{40}$ = c. $\frac{8}{11}$ =

4. Change the following to reduced fractions:

a. 0.26 = b. 3.043 = c. 7.8 =

5. Complete the following table:

	MINIMUM LENGTH	MAXIMUM LENGTH
a. 2.234 in ± .002 in		
b. 6.335 in $^{+\ .005\ \text{in}}_{-\ .002\ \text{in}}$		
c. $5\frac{11}{16}$ in ± $\frac{1}{32}$ in		

6. Change to reduced fractions:

a. 14% = b. 25% = c. 36% =

7. Change to decimals:

a. 32% = b. 6.4% = c. 5% =

8. **Change to percents:**

a. 0.335 =   b. 0.024 =

c. $\frac{3}{4}$ =   d. $\frac{7}{8}$ =

9. **Solve the following percent problems:**

a. 3.5% of the parts produced on press 30-22 were rejected yesterday. If 3750 parts were produced, how many were rejected?

b. Of the 280 Diamonite employees, 60 are salaried workers. What percent of the employees at Diamonite are salaried? (NOTE: Numbers are approximate)

c. On 4/22/93, E & S had only 42 pieces that were outside the tolerance limits. If these 42 pieces represent 3% of the pieces produced, how many pieces were produces in E & S on this date?

d. When making a purchase, sales tax will add 5.75% to the marked price. How much would be due on items totaling $143.54 before tax?

e. A test piece is found to shrink 40% when dried. If the wall thickness of the piece measured 0.124 inches prior to drying, what is the wall thickness after drying?

10. **Complete the following table:**

	MINIMUM LENGTH	MAXIMUM LENGTH
a. 2.250 in - 2%		
b. 6.300 in $^{+\,3\%}_{-\,2\%}$		

ANSWERS:

1a. $\frac{7}{16}$; b. $\frac{3}{20}$; c. $\frac{31}{16}$ or $1\frac{15}{16}$; d. $3\frac{13}{16}$;

e. 40.35 ; f. 31.17 ; g. 100.19 ; h. 48.54 ;

2a. $\frac{1}{10}$; b. 24 ; c. $\frac{7}{6}$ or $1\frac{1}{6}$; d. $\frac{4}{3}$ or $1\frac{1}{3}$;

e. 2.162 ; f. 0.0021 ; g. 30 ; h. 0.001008 ;

3a. 1.875 ; b. 0.275 ; c. 0.727272.. ;

4a. $\frac{13}{50}$; b. $3\frac{43}{1000}$; c. $7\frac{4}{5}$;

5a. 2.232 - 2.236 inches;

b. 6.333 - 6.340 inches;

c. $5\frac{21}{32}$ - $5\frac{23}{32}$ inches;

6a. $\frac{7}{50}$; b. $\frac{1}{4}$; c. $\frac{9}{25}$;

7a. 0.32 ; b. 0.064 ; c. 0.05 ;

8a. 33.5% ; b. 2.4% ; c. 75% ; d. 87.5% ;

9a. 131 rejected ; b. 21.4% salaried ; c. 1400 pieces ;

d. $151.79 ; e. 0.074 inches.

10a. 2.205 - 2.250 inches;

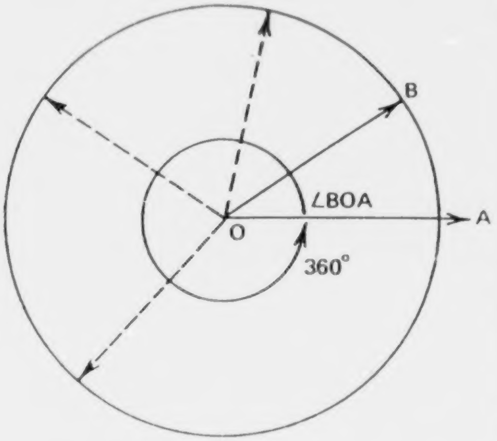
b. 6.174 - 6.489 inches.

UNDERSTANDING ANGLES

REMEMBER THIS–

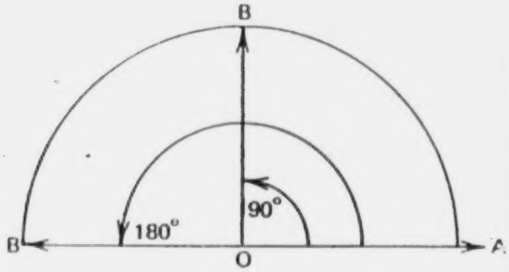
1. In the drawing, $\overline{OB}$ is a line that turns, or pivots, around O. Wherever it stops, it makes an *angle* with the line $\overline{OA}$. The angle is called angle BOA, or ∠BOA.

2. If $\overline{OB}$ goes all the way around and comes back to its starting place, it makes a full circle around O. A full circle is 360 degrees, or 360°.

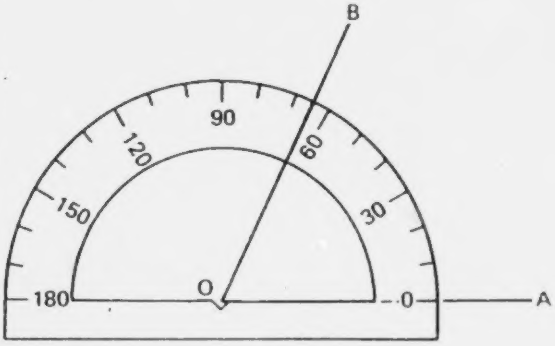


3. If $\overline{OB}$ goes $\frac{1}{4}$ of the way around the circle, it makes an angle of 90° with $\overline{OA}$, because $\frac{1}{4}$ of 360° is 90°. An angle of 90° is called a *right angle*.

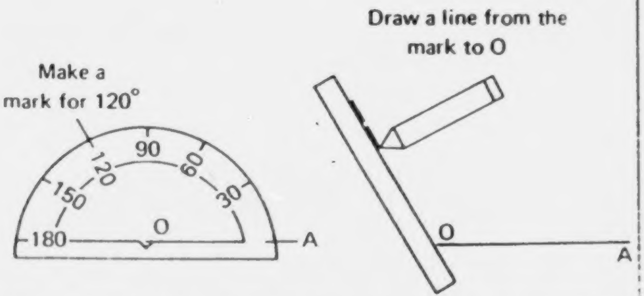
4. If $\overline{OB}$ goes $\frac{1}{2}$ of the way around the circle, it makes an angle of 180° with $\overline{OA}$. An angle of 180° is a straight line. It is called a *straight angle*.



5. The drawing shows how to measure an angle with a *protractor*. The measure of ∠BOA is 65°.

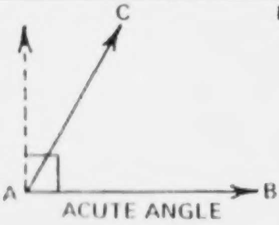

B
90
120
60
150
30
180
O
0
A

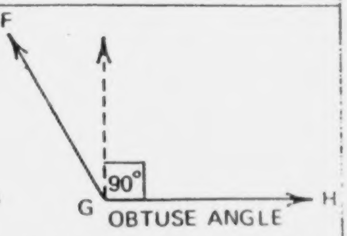
6. A protractor can be used to draw an angle of any measure. The drawing shows how to draw an angle of 120°.


Make a mark for 120°
90
120
60
150
30
180
O
A
Draw a line from the mark to O
O
A

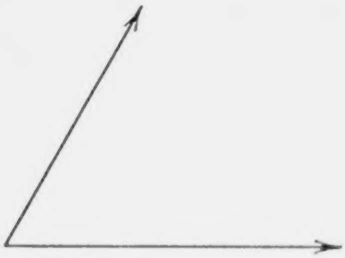
7. An angle that is less than 90° is called an *acute angle*. Angle CAB is an acute angle.

8. An angle that is more than 90° is called an *obtuse angle*. Angle FGH is an obtuse angle.

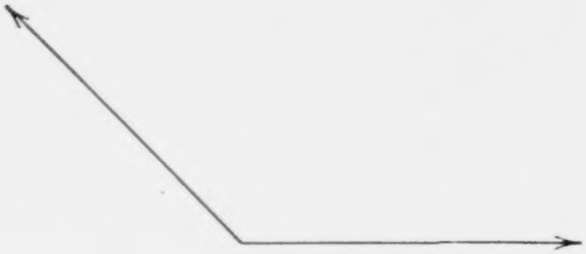

C
A
B
ACUTE ANGLE


F
90°
G
H
OBTUSE ANGLE

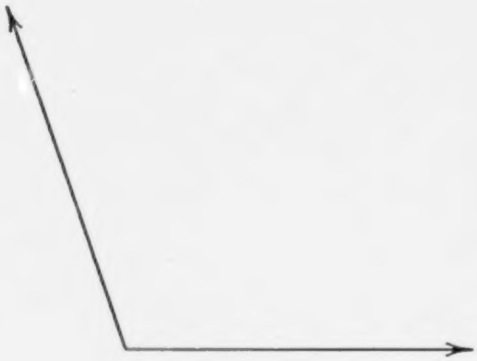
1. Using a protractor, measure each of these angles.



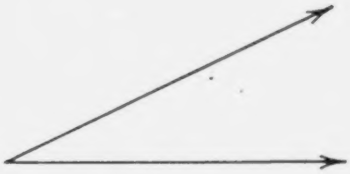
(A) ______



(B) ______



(C) ______

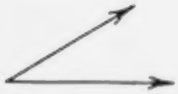


(D) ______

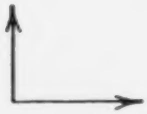
2. Using a protractor, draw the following angles.

(A) 15° (B) 60° (C) 90° (D) 115°

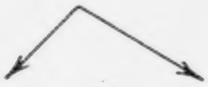
3. Tell whether each of these angles is an acute angle, a right angle, or an obtuse angle.



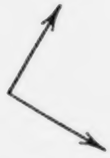
(A) ____________________



(B) ____________________



(C) ____________________



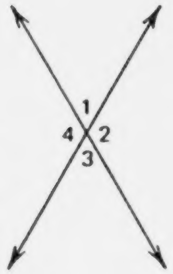
(D) ____________________

ANGLE RELATIONSHIPS

REMEMBER THIS–

1. When two lines cross, they make four angles. Each pair of opposite angles are called *vertical angles.* Vertical angles are equal. In the drawing,

$\angle 1 = \angle 3$ $\qquad$ $\angle 2 = \angle 4$

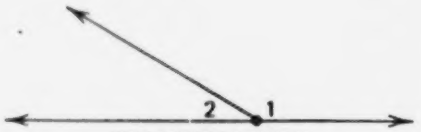


VERTICAL ANGLES

2. If two angles together make a straight angle, they are called *supplementary angles.* Each angle is the *supplement* of the other angle. The sum of two supplementary angles is 180°. In the drawing,

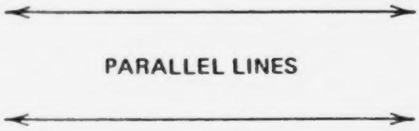
$\angle 1 + \angle 2 = 180°$

$\angle 2$ is the supplement of $\angle 1$
$\angle 1$ is the supplement of $\angle 2$



STRAIGHT ANGLE

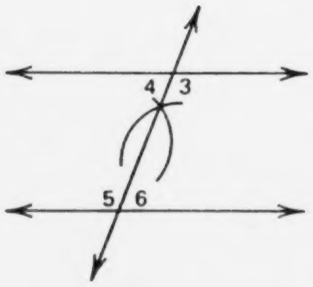
3. Parallel lines are lines that never cross. They stay the same distance apart. If another line crosses two parallel lines, it makes eight angles. Many of these angles are equal.



PARALLEL LINES

Alternate interior angles are equal. In the drawing,

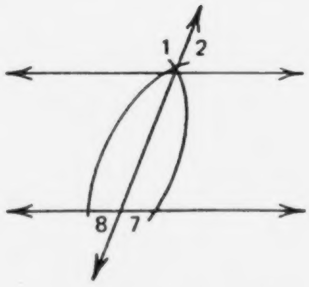
$\angle 4 = \angle 6$ $\qquad$ $\angle 3 = \angle 5$



ALTERNATE INTERIOR ANGLES

Alternate exterior angles are equal. In the drawing,

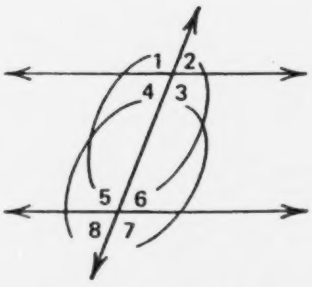
$\angle 1 = \angle 7$ $\qquad$ $\angle 2 = \angle 8$



ALTERNATE EXTERIOR ANGLES

Corresponding angles are equal. In the drawing,

$\angle 1 = \angle 5$ $\qquad$ $\angle 2 = \angle 6$
$\angle 4 = \angle 8$ $\qquad$ $\angle 3 = \angle 7$



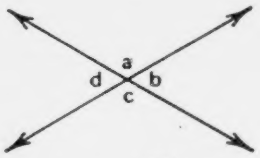
CORRESPONDING ANGLES

Name ______________________ Class __________ Date __________

EXERCISE

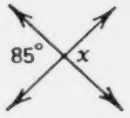
2 FINDING ANGLES

1. Name two pairs of vertical angles.

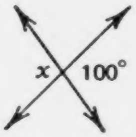


(A) ________ (B) ________

2. In each case find the measure of the angle marked *x*.

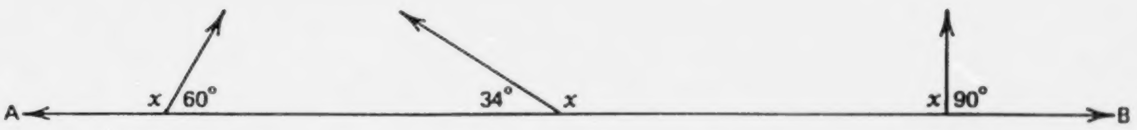


x = ________



x = ________

3. $\overline{AB}$ is a straight line. In each case find the measure of the angle marked *x*.


A
x
60°
34°
x
x
90°
B

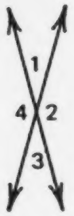
x = ______ *x* = ______ *x* = ______

4. Name the supplement of each angle.

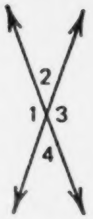
(A) 80° ______ (B) 90° ______ (C) 45° ______ (D) 135° ______ (E) 179° ______

5. Find the measure of all the angles. Remember to use supplementary angles.

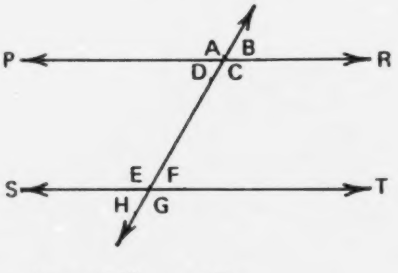
∠1 = 30°
∠2 = ______
∠3 = ______
∠4 = ______



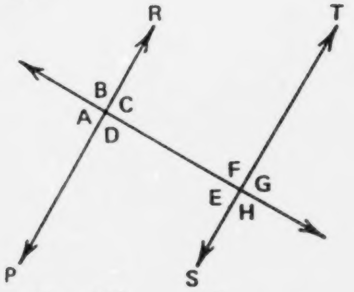
∠1 = 140°
∠2 = ______
∠3 = ______
∠4 = ______



6. $\overline{PR}$ and $\overline{ST}$ are parallel lines. Find the measure of all the angles.

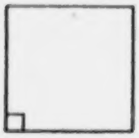

P
A
B
R
D
C
S
E
F
T
H
G

∠C = 120° ∠E = ______
∠A = ______ ∠F = ______
∠B = ______ ∠G = ______
∠D = ______ ∠H = ______


R
T
B
C
A
D
F
G
E
H
P
S

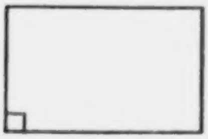
∠B = 80° ∠E = ______
∠A = ______ ∠F = ______
∠C = ______ ∠G = ______
∠D = ______ ∠H = ______

2-D GEOMETRIC SHAPES



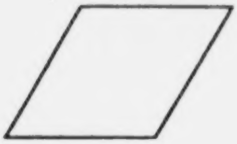
SQUARE

$A = b \cdot h$
$= \text{base} \cdot \text{height}$



RECTANGLE

$A = b \cdot h$

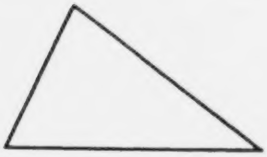


RHOMBUS

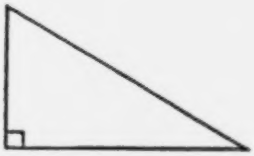
$A = b \cdot h$

PARALLELOGRAM

$A = b \cdot h$



TRIANGLE

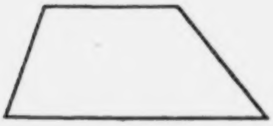


RIGHT TRIANGLE

$A = ½ \cdot b \cdot h$, or

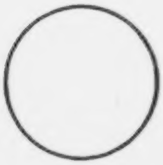
$A = \sqrt{s(s-a)(s-b)(s-c)}$

where $s = ½ \cdot P$



TRAPEZOID

$A = b_{ave} \cdot h$



CIRCLE

$A = \pi \cdot r^2$ $(\pi = 3.1416)$

$C = \pi \cdot d$

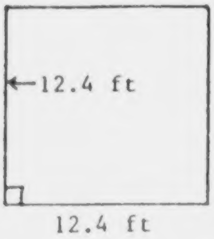
GEOMETRY - 2D

NAME ______________________________

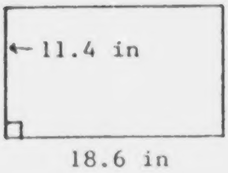
FIGURE	TYPE OF FIGURE	AREA - cm^2
A		
B		
C		
D		
E		
F		
G		
H		

FOR PRACTICE, FIND THE AREA OF EACH OF THE FOLLOWING:

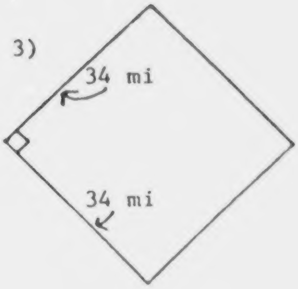
1)


12.4 ft
12.4 ft

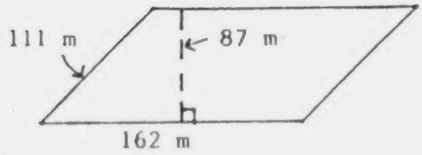
2)


11.4 in
18.6 in

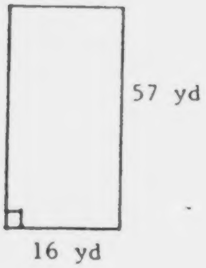
3)



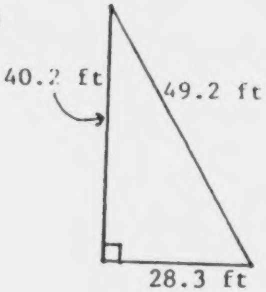
4)


111 m
87 m
162 m

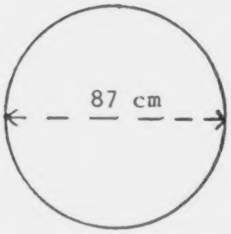
5)



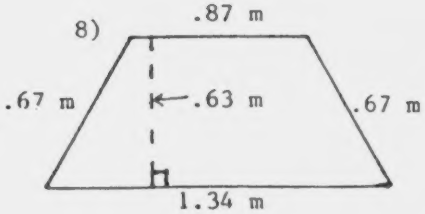
6)


40.2 ft
49.2 ft
28.3 ft

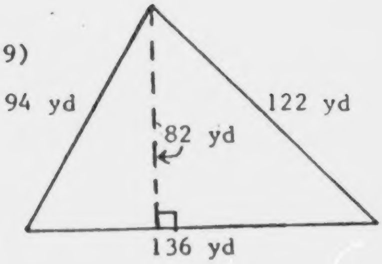
7)



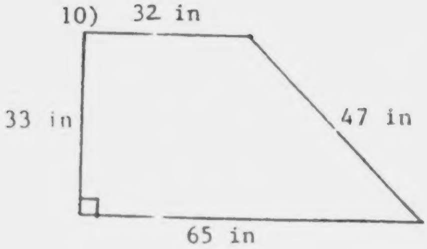
8)


.87 m
.67 m
.63 m
.67 m
1.34 m

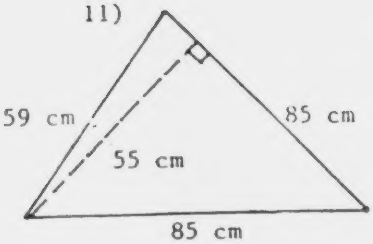
9)


94 yd
122 yd
82 yd
136 yd

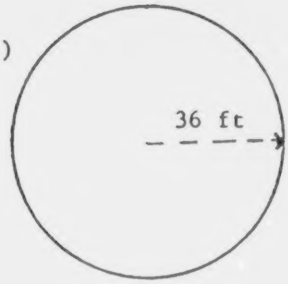
10)


32 in
33 in
47 in
65 in

11)


59 cm
85 cm
55 cm
85 cm

12)



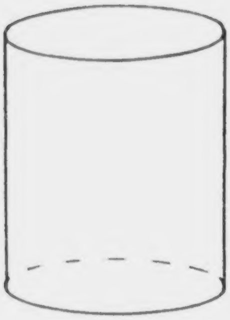
ANSWERS (to three significant digits)

1) 154 ft^2 2) 212 in^2 3) 1160 mi^2 4) 14,100 m^2

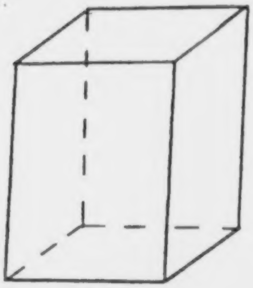
5) 912 yd^2 6) 569 ft^2 7) 5940 cm^2 8) 0.696 m^2

9) 5580 yd^2 10) 1600 in^2 11) 2340 cm^2 12) 4070 ft^2

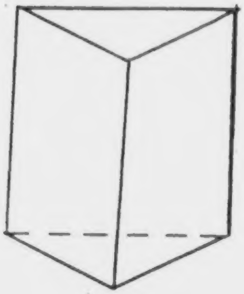
3-D GEOMETRIC SHAPES



CYLINDER

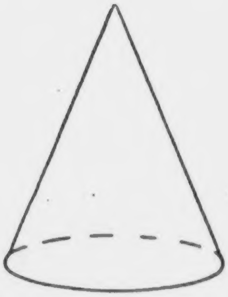


RECTANGULAR
PRISM

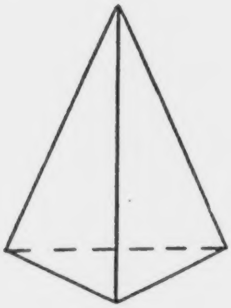


TRIANGULAR
PRISM

$V = A_{base} \cdot H$

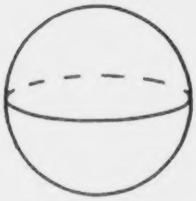


CONE



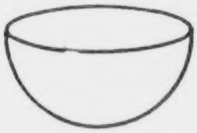
TRIANGULAR
PYRAMID

$V = \frac{1}{3} \cdot A_{base} \cdot H$



SPHERE

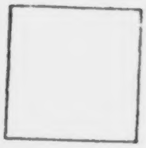
$V = \frac{4}{3} \cdot \pi \cdot r^3$



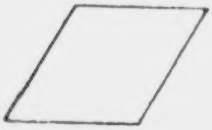
HEMISPHERE

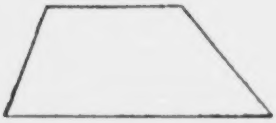
SOME BASIC GEOMETRIC FIGURES

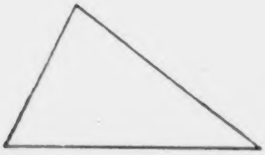
RECTANGLE

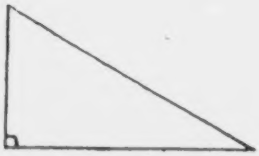

SQUARE

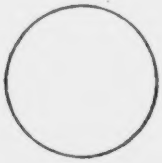
PARALLELOGRAM

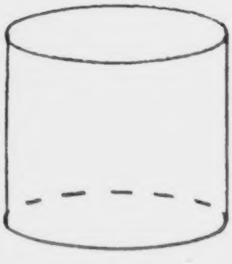

RHOMBUS

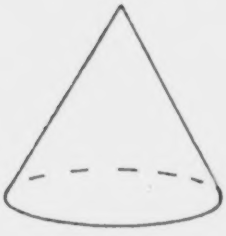

TRAPEZOID

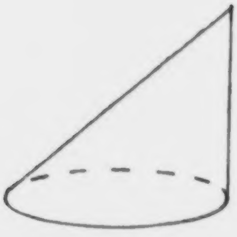

TRIANGLE

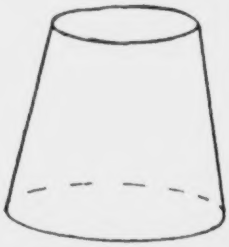

RIGHT TRIANGLE

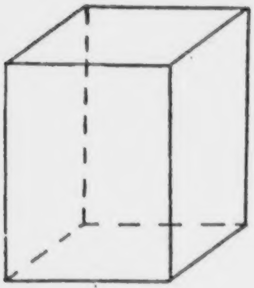

CIRCLE

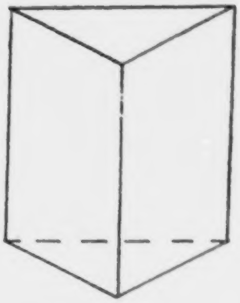

CYLINDER

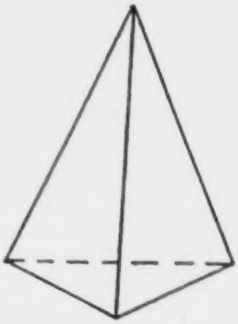

CONE
(RIGHT)

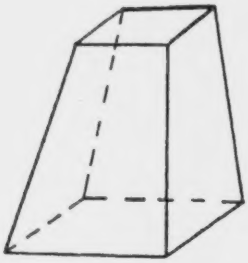

CONE
(OBLIQUE)

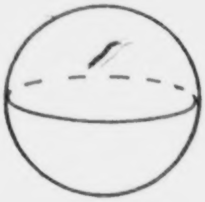

FRUSTUM OF
A CONE

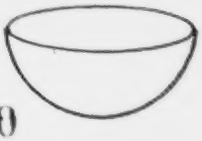

RECTANGULAR
PRISM

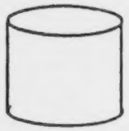

TRIANGULAR
PRISM


TRIANGULAR
PYRAMID

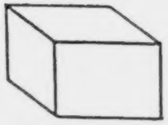

FRUSTUM OF
A PRISM

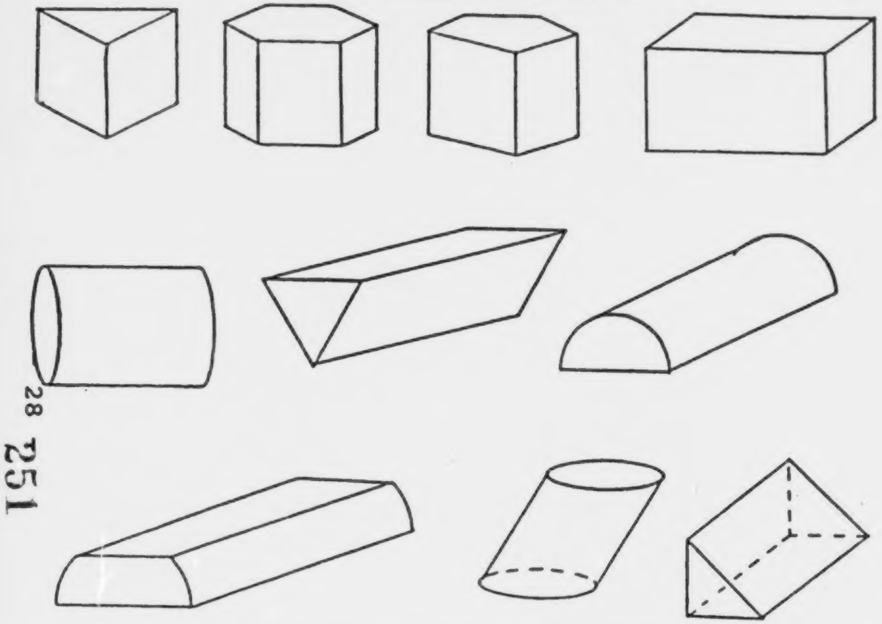

SPHERE


HEMISPHERE

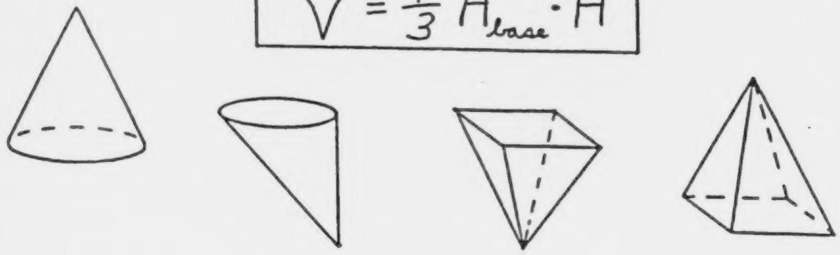


$$\boxed{V = A_{base} \cdot H}$$

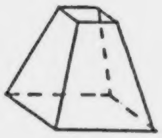


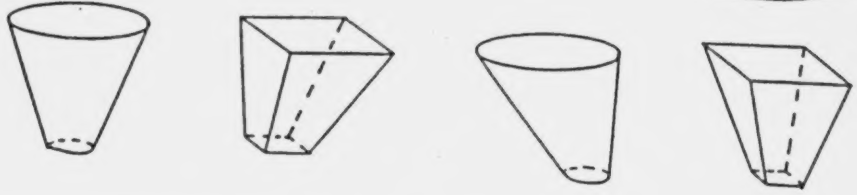


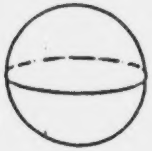
$$\boxed{V = \frac{1}{3} A_{base} \cdot H}$$



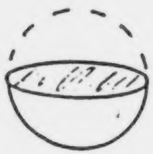
$$\boxed{V = \frac{1}{3} H\left(A_T + A_B + \sqrt{A_T A_B}\right)}$$



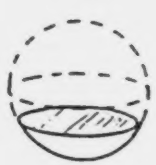




$$V = \frac{4}{3}\pi r^3$$



$$V = \left(\frac{4}{3}\pi r^3\right) \div 2 = \frac{2}{3}\pi r^3$$



$$V = \frac{1}{3}\pi h^2(3r - h)$$

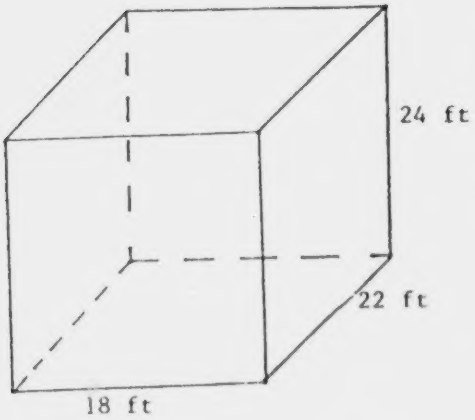
GEOMETRY - 3D

NAME ________________________________

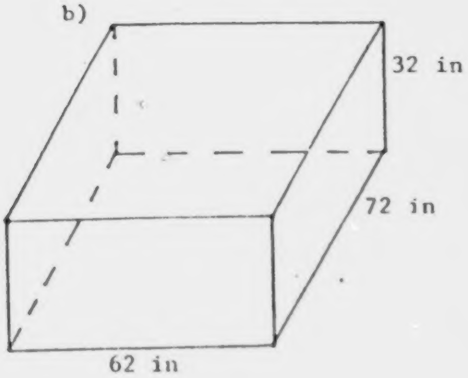
FIGURE	TYPE OF FIGURE	VOLUME - CM^3
AA		
BB		
CC		
DD		
EE		
FF		
GG		
HH		
II		
JJ		
KK		
LL		

FOR PRACTICE, FIND THE VOLUME OF EACH OF THE FOLLOWING:

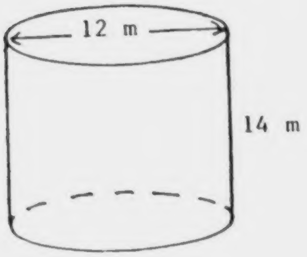
a)


24 ft
22 ft
18 ft

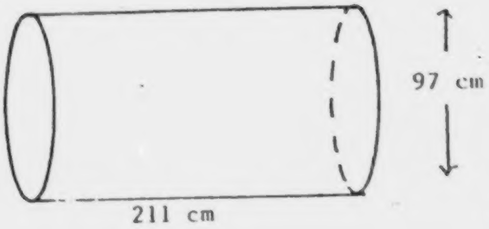
b)


32 in
72 in
62 in

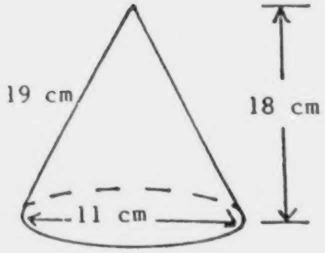
c)



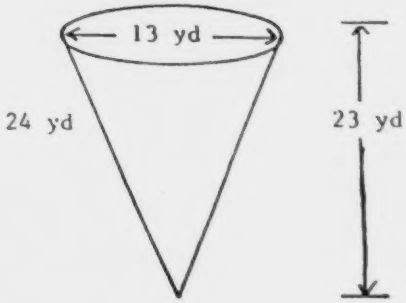
d)



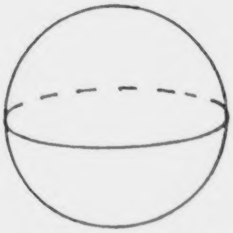
e)


19 cm
18 cm
11 cm

f)

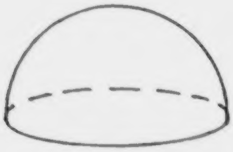

13 yd
24 yd
23 yd

g)



diameter = 17.4 cm

h)



radius = 12.3 yd

ANSWERS (to three significant digits)

a) 9500 ft^3 b) 143,000 in^3 c) 1580 m^3 d) 1,560,000 cm^3

e) 570 cm^3 f) 1020 yd^3 g) 2760 cm^3 h) 3900 yd^3

THE METRIC SYSTEM

The standard unit of length in the metric system is the meter, which is about 40 inches long. Using the meter, we can obtain the standard unit for volume, the liter, which is about the size of a quart, and the standard unit for mass, the gram, which is about twice the mass of a standard paper clip.

Rather than have completely different names for units larger or smaller than these standard units as in the English system, the metric system makes use of standard prefixes which, when attached to the basic unit, name larger or smaller units of measurement.

These metric prefixes have power of ten meanings to avoid numerous zeroes or the use of scientific notation. The more common prefixes appear below with their abbreviation and their numerical meaning. The **bold** prefixes are ones that you should know.

giga(G):	1,000,000,000 or 10^9	deci (d):	0.1 or 10^{-1}
mega (M):	1,000,000 or 10^6	**centi (c):**	0.01 or 10^{-2}
kilo (k):	1,000 or 10^3	**milli (m):**	0.001 or 10^{-3}
hecto (h):	100 or 10^2	**micro (μ):**	0.000001 or 10^{-6}
deka (da):	10 or 10^1	nano (n):	0.000000001 or 10^{-9}

Certainly, it would be no major project to learn these prefixes, and thus obtain a basic understanding of the metric system. In actual use of the metric system, not all of these prefixes are commonly used with each of the basic units. The following section outlines the common units of measure for length, mass and volume, giving approximate size and uses for each. While working through this section, you should try to "think metric". That is, you should "picture" lengths in meters and centimeters, for instance, rather than in feet and inches.

Length

Units of length in the metric system are derived from the standard length known as the meter. The meter is the appropriate unit for measuring the height of a building, the dimensions of a house or the lot it is built on, the length of a section of rope, or the distance from home plate to the fence on a baseball field. A meter is about 40 inches long.

EXAMPLES:

a) A football field is about 90 m from goal line to goal line.
b) The height of a room is usually between 2½ and 3 meters.
c) A small room might be 3 or 4 meters long and a large room might be 6 or 8 meters long.

Another commonly used unit for length in the metric system is the centimeter. A centimeter is about the width of one's small finger, and would be used to measure one's height, the length of your pencil, or book, or the distance around one's waist. One inch is about 2½ centimeters.

EXAMPLES:

a) Most people's heights are between 150 and 200 centimeters. 150 cm is about 4 ft 11 in and 200 cm is about 6 ft 7 in.
b) A new pencil is about 20 cm long.
c) A nickel is about 2 cm wide.
d) This page is 28 cm long.

A unit of measure even smaller than a centimeter is the millimeter. A millimeter is about the same as the thickness of a dime and would be used where fractions of an inch would normally be used.

EXAMPLES:

a) A ¼ in socket would be about 6 millimeters.
b) A honey bee would be between 10 and 15 mm long and the individual hive cells are about 5 mm wide.
c) A small bolt might be between 2 and 5 mm in diameter.
d) The thickness of a piece of plywood would be between 10 and 30 mm.
e) A man's ring might be 18 mm in diameter.

A unit of length used for large distances in the metric system is the kilometer, which is slightly more than one half of a mile. The kilometer is used on traffic signs, on road maps, in geography books, for Olympic bicycle races and to measure the distance to the moon.

EXAMPLES:

a) A 3 mi jogging track would be a little less than 5 kilometers.

b) The distance from Akron to Cleveland is about 80 km.

c) The distance from ATI to downtown Wooster is about 3 km.

Try to determine the choice which best describes the length of each of the following thinking metrically; there should be no need to convert to inches or miles!

____ 1. Width of a door
(a) 2 m (b) 80 cm (c) 10 cm

____ 2. Diameter of a penny
(a) 1.9 mm (b) 19 cm (c) 1.9 cm

____ 3. One hour drive on a highway
(a) 100 km (b) 10 km (c) 1000 m

____ 4. Width of a suburban street
(a) 15 mm (b) 150 m (C) 5 m

____ 5. Length of a paper clip
(a) 10 cm (b) 3 cm (c) 3 mm

____ 6. Width of a pencil
(a) 7 mm (b) 70 cm (c) 7 cm

____ 7. Height of a woman
(a) 16 m (b) 16 cm (c) 1.6 m

Volume - Capacity

In the metric system, units for measuring length and units for measuring volume are interrelated. The basic unit for volume in this system is the liter, which is defined as the amount of volume in one cubic decimeter (a cube 10 cm on each edge). The liter is slightly larger than a quart and is the unit for most everyday capacity measurements. Milk, pop, cider, paint thinner, and gasoline for your car would all be measured in liters.

EXAMPLES:

a) A gallon of milk is about 4 liters.
b) An 8-oz cup of coffee is about ¼ liter.
c) A 15 gallon gas tank (60 qt) is about 57 L.
d) A small aquarium might be about 20 L.

For measuring small volumes in the metric system, the milliliter is used. Doctors, druggists and scientists measure most liquids in milliliters. A milliliter has the same volume as a cubic centimeter (cc or cm^3), which is about 1/5 of a teaspoon.

EXAMPLES:

a) A flu shot might contain 5 milliliters of medicine.
b) A tablespoon of liquid is a little less than 15 ml.
c) A medicine bottle might contain 100 ml.

To measure large volumes in the metric system, the cubic meter (a cube 1 m long on each edge) is used. The cubic meter is equal in volume to 1000 liters and could also be called a kiloliter, although this is not commonly done. The cubic meter would be used to specify the volume of a room, a silo, or a quantity of sand, gravel or concrete.

EXAMPLES:

a) A normal size refrigerator would have a volume of ½ cubic meter.

b) A small room would have a volume of 20 or 30 cubic meters.

c) A trough for feeding hogs might contain 1 m^3.

Now try to determine the choice which best describes the volume of each of the following, thinking metrically.

____ 1. A bottle of pop
(a) 7 l (b) 700 ml (c) 70 ml

____ 2. A small room (9 ft x 12 ft)
(a) 40 m^3 (b) 400 m^3 (c) 4 m^3

____ 3. A bottle of aspirin
(a) 6 ml (b) 60 ml (c) 6 l

____ 4. A quart of oil
(a) 0.1 l (b) 1 l (c) 10 ml

____ 5. A gas tank
(a) 75 l (b) 75 ml (c) 7.5 m^3

____ 6. A box of cereal
(a) 2.5 ml (b) 25 ml (c) 2.5 l

____ 7. An eye dropper
(a) 1.5 ml (b) 1.5 l (c) .15 l

Weight - Mass

Units for weight or mass in the metric system are derived from the standard unit known as the gram. The gram is a very small unit of mass, defined to be the weight of 1 milliliter of water; this turns out to be about 0.002 lb. The gram would be used to measure the mass of an aspirin tablet, a can of soup, a package of cereal, a tube of toothpaste or a bar of soap.

EXAMPLES:

a) A paper clip has a mass of about ½ gram.
b) A nickel has a mass of about 5 grams.
c) A flashlight battery weighs about 100 g.
d) A stick of margarine weighs about 110 g.

A larger unit for measuring weight is the kilogram. The kilogram is the appropriate unit for measuring the weight of a person, a sack of flour, a bag of potatoes, or luggage at an airline counter. It is used where pounds are normally used and is a little over 2 lb on the earth's surface.

EXAMPLES:

a) Most people weigh between 50 kg and 100 kg (110 - 220 lb).
b) A small car weighs between 1000 kg and 1500 kg.
c) A desk telephone weighs about 1 kg.
d) A newborn baby usually weighs between 2 kg and 4 kg.
e) An unabridged dictionary would weigh between 3 and 5 kg.

To measure very small amounts of mass we have the milligram. This small unit of weight is used most often by the medical profession to measure drugs and medications.

EXAMPLES:

a) A vitamin C capsule would contain between 250 mg and 500 mg of vitamin C.

b) Some aspirin tablets contain 400 mg aspirin.

c) A common multivitamin capsule contains about 2 mg of vitamin B-2 (Riboflavin).

d) The U.S. recommended daily allowance of iodine is 25 mg.

Determine the choice which best describes the weight of each of the following thinking metrically.

_____ 1. Can of soup
(a) 3 g (b) 35 g (c) 350 g

_____ 2. Quart of milk
(a) 1 kg (b) 10 kg (c) 10 g

_____ 3. Sugar cube
(a) 20 g (b) 2 g (c) 2 mg

_____ 4. A small sack of sugar (5 lb)
(a) 5 kg (b) 1 kg (c) 2 kg

_____ 5. A football player
(a) 110 kg (b) 11 kg (c) 1200 g

_____ 6. A drop of water
(a) 50 g (b) 50 mg (c) 2 kg

_____ 7. A common barbell set
(a) 50 kg (b) .5 kg (c) 450 kg

Since we live in a country which uses two systems of measurement, we need to deal with relationships between the English system and the metric system. Some conversion factors or equivalences will be convenient to use. I include here metric-metric, English-metric and English-English equivalences. This collection is not exhaustive, but includes the most frequently used relationships.

Metric - Metric Conversion Factors

Factors for Length

1 km = 1000 m
1 m = 100 cm
1 m = 1000 mm

Factors for Volume

1 kL = 1 m^3
1 kL = 1000 L
1 L = 1000 mL
1 mL = 1 cm^3 = 1 cc

Factors for Weight

1 kg = 1000 g
1 g = 1000 mg
1 metric ton = 1000 kg

Factors for Area

1 are = 100 m^2
1 hectare(ha) = 100 are

English - Metric Conversion Factors

Factors for Length

1 inch = 2.54 cm
1 meter ≈ 39.4 in
1 km ≈ .621 miles

Factors for Volume

1 L ≈ 1.06 qt (liquid)
1 bushel ≈ 35.24 L

Factors for Area

1 hectare(ha) ≈ 2.47 acres

Factors for Weight
(earth's surface)

1 lb ≈ 454 g
1 kg ≈ 2.20 lb

Factors for Force

1 lb ≈ 4.45 Newtons(N)
1 N ≈ 0.225 lb

Factors for Mass

14.6 kg ≈ 1 slug

English - English Conversion Factors

Factors for Length

1 foot = 12 inches
1 yard = 3 feet
1 mile = 5280 feet

1 rod = 16.5 feet
1 chain = 4 rods
1 mile = 8 furlongs

Factors for Weight

1 lb = 16 oz
1 ton = 2000 lb
1 long ton = 2240 lb

Factors for Area

1 acre = 43560 ft^2
1 sq mile = 640 acre
1 acre = 10 sq chains
1yd^2 = 9 ft^2
1ft^2 = 144 in^2

Factors for Volume

Liquid Measure

1 pt = 2 cups
1 qt = 2 pt
1 gal = 4 qt
1 qt = 32 fl oz
1 cup = 8 fl oz
1 Tbs = 3 tsp
1 cup = 16 Tbs
1 gal = 128 fl oz
1 gal = 231 in^3

Dry Measure

1 qt = 2 pt
1 peck = 8 qt
1 bu = 4 pecks
1 bu ≈ 1.244 ft^3
1 bu ≈ 2150 in^3
1 yd^3 = 27 ft^3
1 ft^3 = 1728 in^3

SAMPLE PROBLEMS
CHANGING UNITS OF MEASURE

1. Change 14.2 inches into centimeters.

2. Change 18,000 yards into miles.

3. Change 8.25 feet into centimeters.

4. Change 85 cm/sec into in/sec.

5. Change 16 ft/min into cm/sec.

6. Change 15,000 in^3/min into gal/hr.

ANSWERS:

1. 36.1 cm 2. 10.2 mi 3. 251 cm
4. 33.5 in/sec 5. 8.13 cm/sec 6. 3900 gal/hr

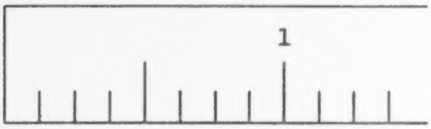
READING RULERS

The scale on a ruler can be determined by counting the spaces between numbered divisions.

If there are 8 spaces, then each represents 1/8 of the way between numbered divisions, if there are 15 spaces, each represents 1/15 of the way between numbered divisions, etc.

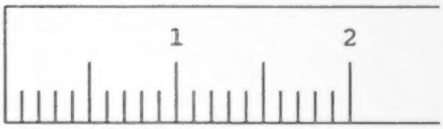
Determine the scale for each of the following rulers, and mark the first three lines.

(a)



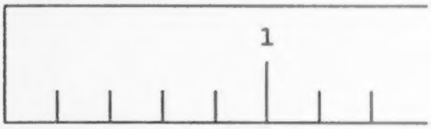
smallest division = ______

(b)



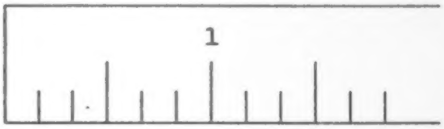
smallest division = ______

(c)



smallest division = ______

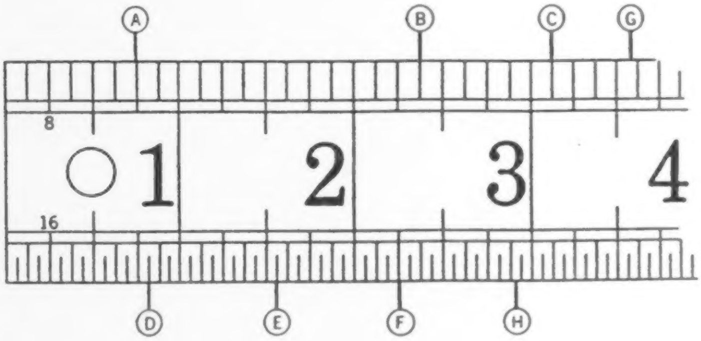
(d)



smallest division = ______

Now practice by reading the following rulers:

1.

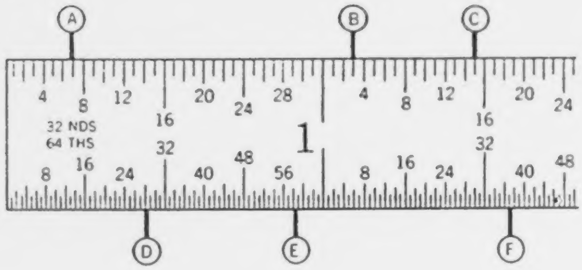


A. ______ B. ______ C. ______

D. ______ E. ______ F. ______

G. ______ H. ______

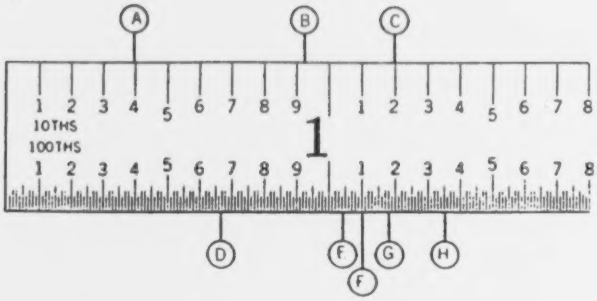
2.


A
B
C
4
8
12
16
20
24
28
4
8
12
16
20
24
32 NDS
64 THS
1
8
16
24
32
40
48
56
8
16
24
32
40
48
D
E
F

A. __________ B. __________ C. __________

D. __________ E. __________ F. __________

3.


A
B
C
1 2 3 4 5 6 7 8 9
1 2 3 4 5 6 7 8
10THS
100THS
1
1 2 3 4 5 6 7 8 9
1 2 3 4 5 6 7 8
D
F
F
G
H

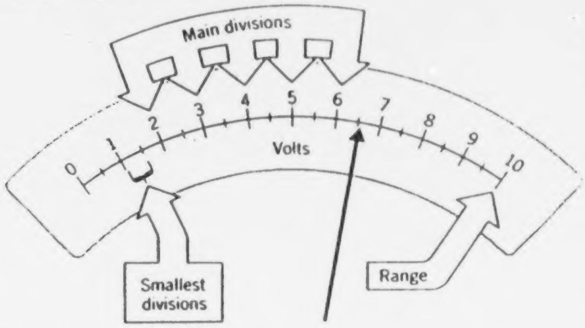
A. __________ B. __________ C. __________ D. __________

E. __________ F. __________ G. __________ H. __________

Meters

The *range* of a meter is its full-scale or maximum reading. The *main* divisions of the scale are the numbered divisions. The *small* divisions are the smallest marked portions of a main division. For example, on the following meter scale,

The *range* is 10 volts;

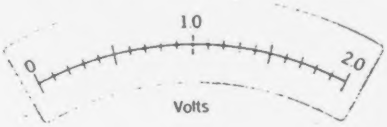


Main divisions
0
1
2
3
4
5
6
7
8
9
10
Volts
Smallest divisions
Range

the *main* divisions are 1 volt; the *smallest* divisions are 0.5 volt.

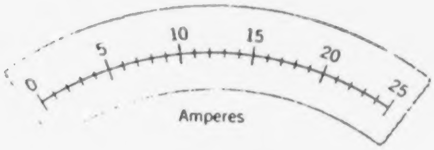
Find the range, main divisions, and smallest divisions for each of the following meter scales.

(a) range = ________
main divisions = ________
smallest divisions = ________



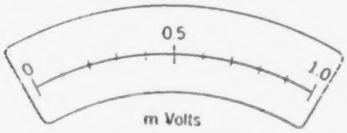
0
1.0
2.0
Volts

(b) range = ________
main divisions = ________
smallest divisions = ________



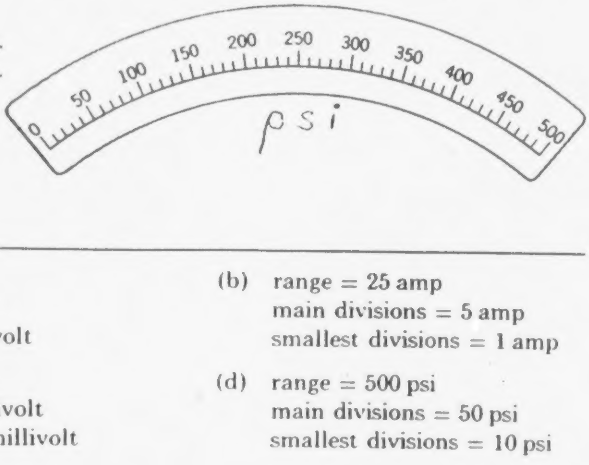
0
5
10
15
20
25
Amperes

(c) range = ________
main divisions = ________
smallest divisions = ________



0
0.5
1.0
m Volts

(d) range = ________
main divisions = ________
smallest divisions = ________



0
50
100
150
200
250
300
350
400
450
500
psi

Check your answers in **46**

---

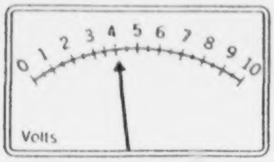
46 (a) range = 2.0 volt
main divisions = 1.0 volt
smallest divisions = 0.1 volt

(b) range = 25 amp
main divisions = 5 amp
smallest divisions = 1 amp

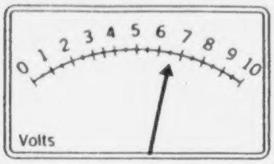
(c) range = 1.0 millivolt
main divisions = 0.5 millivolt
smallest divisions = 0.1 millivolt

(d) range = 500 psi
main divisions = 50 psi
smallest divisions = 10 psi

To read a meter scale, we can either choose the small scale division nearest to the pointer, or we can estimate between scale markers. For example, this meter

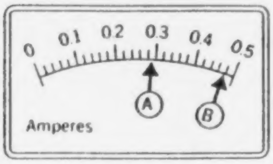

0 1 2 3 4 5 6 7 8 9 10
Volts

reads exactly 4.0 volts. But this meter


0 1 2 3 4 5 6 7 8 9 10
Volts

reads 6.5 volts to the nearest scale marker, or 6.6 volts if we estimate between scale markers. The smallest division is 0.5 volt.

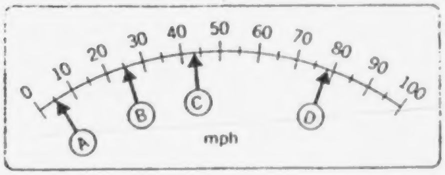
On the following meter scale


0 0.1 0.2 0.3 0.4 0.5
A
B
Amperes

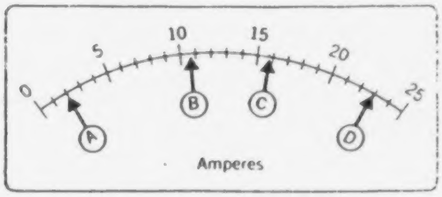
the smallest scale division is $\frac{1}{5}$ of 0.1 amp or 0.02 amp. The reading at A is therefore 0.2 plus 4 small divisions or 0.28 amp. The reading at B is 0.4 plus $3\frac{1}{2}$ small divisions or 0.47 amp.

Read the following meters. Estimate between scale divisions where necessary.

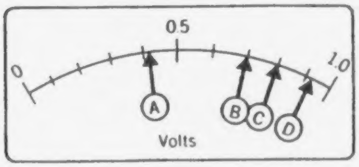
1.


0 10 20 30 40 50 60 70 80 90 100
A B C D
mph

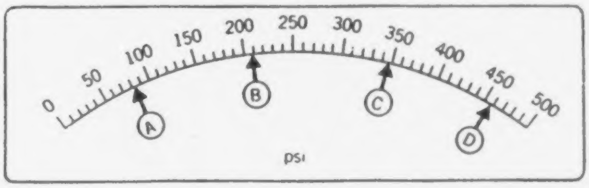
2.


0 5 10 15 20 25
A B C D
Amperes

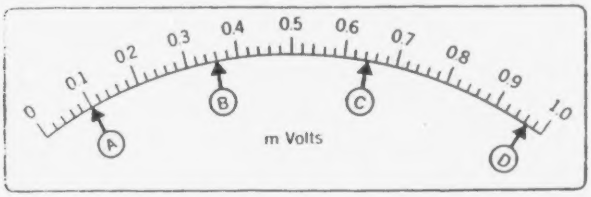
3.


0 0.5 1.0
A B C D
Volts

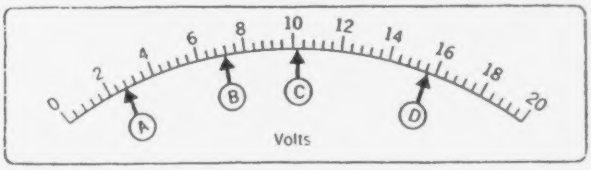
4.


0 50 100 150 200 250 300 350 400 450 500
A B C D
psi

5.


0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
A B C D
m Volts

6.

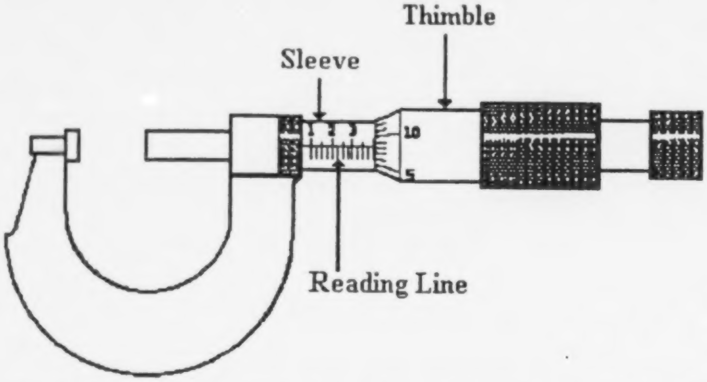

0 2 4 6 8 10 12 14 16 18 20
A B C D
Volts

MICROMETERS

A steel rule can be used to measure a length to the nearest 32nd inch, 64th inch, or even 100th inch. To measure a length with even greater accuracy, specialized precision measuring devices are needed. One of these devices is a **micrometer.**

A micrometer can be used to measure length to the nearest 1000th or 10,000th inch, or to the nearest 100th millimeter, depending on the type of micrometer used.

Let's look first at the standard inch micrometer pictured below.



This micrometer will measure to the nearest 0.001 in (1000th in). The micrometer consists of a highly accurate screw with 40 threads per inch, and a fixed nut. Thus, each rotation of the thimble opens or closes the opening 1/40 inch, or 0.025 inch.

Reading a standard 0.001 inch micrometer consists of three steps:

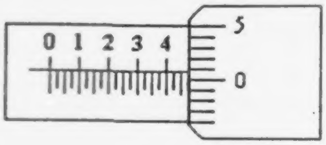
STEP 1: Read the largest numeral visible on the sleeve, and multiply this times 0.100 in.

STEP 2: Count the number of scale spaces (lines) past the last numeral, and multiply this times 0.025 in.

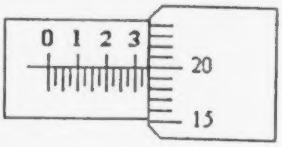
STEP 3: Read the number on the thimble scale, and add this to the total from steps 1 and 2. (That is, each division on the thimble represents 0.001 in)

Practice this procedure on the examples below:

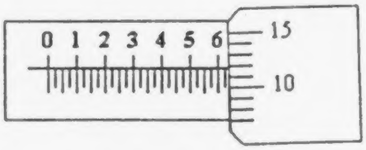
1.

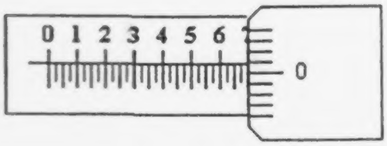


2.

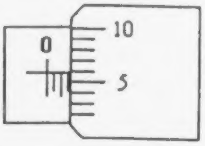


3.

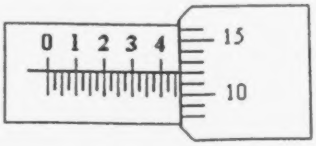




5.

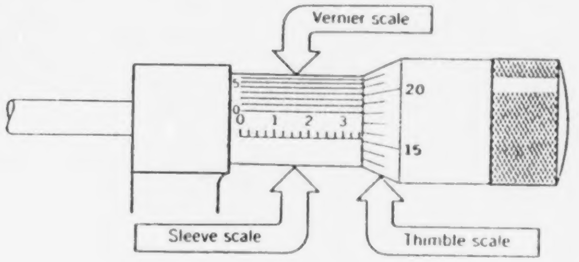


6.



Micrometers Reading in Ten-Thousandths of an Inch

To read a micrometer that measures to the ten-thousandth of an inch, it is necessary to know how to read a vernier scale. This scale will be on the sleeve of the micrometer, and appears as a series of 10 parallel lines.

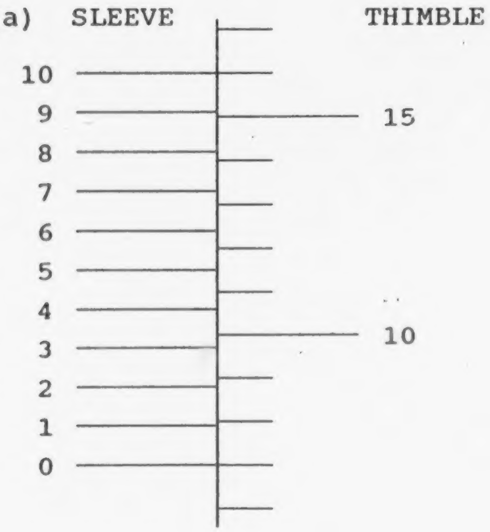

Vernier scale
5
0
0 1 2 3
20
15
Sleeve scale
Thimble scale

To read a micrometer with a vernier scale, first read the micrometer to the thousandth following the three steps previously described, then:

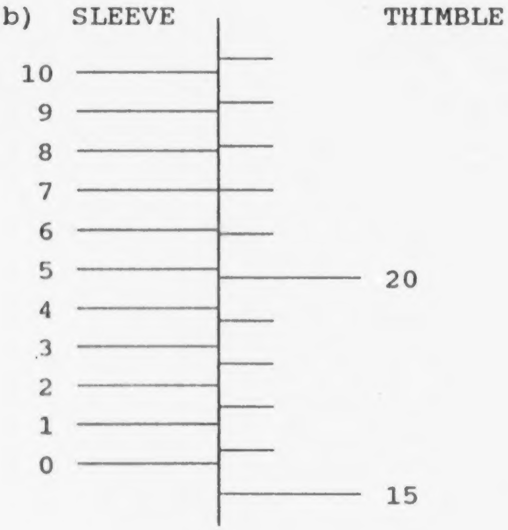
STEP 4: Find the number on the vernier scale that lines up best with any line on the thimble. The number on this line is the digit for ten-thousandth's place.

In the following examples, the digit for ten-thousandth's place would be 0 in (a), and 7 in (b).

(a)

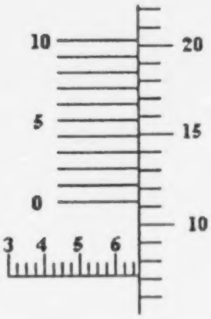

SLEEVE
THIMBLE
10
9
8
7
6
5
4
3
2
1
0
15
10

(b)

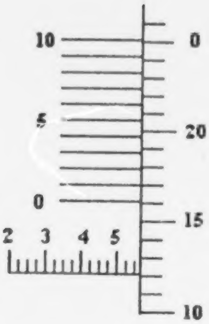

SLEEVE
THIMBLE
10
9
8
7
6
5
4
3
2
1
0
20
15

Now try reading the following vernier micrometers:

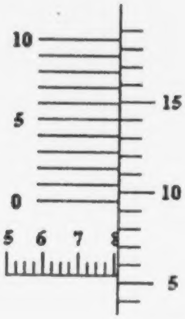
1.


10
5
0
20
15
10
3
4
5
6

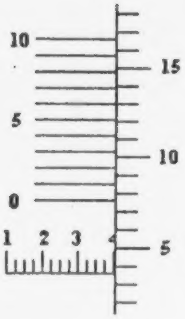
2.


10
5
0
0
20
15
10
2
3
4
5

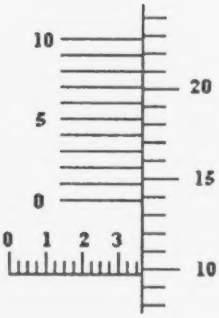
3.


10
5
0
15
10
5
5
6
7
8

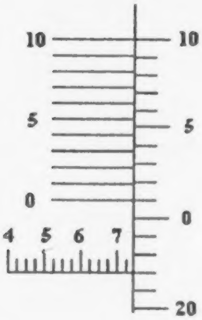
4.


10
5
0
15
10
5
1
2
3
4

5.


10
5
0
20
15
10
0
1
2
3

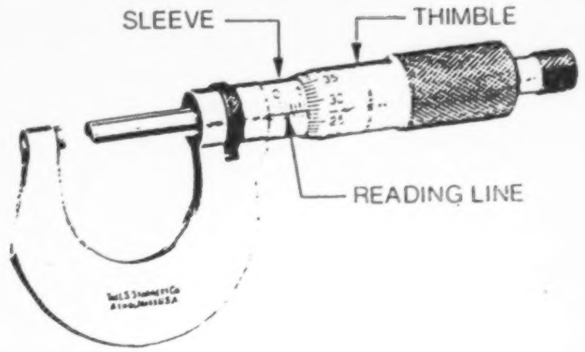
6.


10
5
0
10
5
0
20
4
5
6
7

METRIC MICROMETERS

A metric micrometer works in millimeters (mm) rather than inches. The most common metric micrometer is capable of measuring to the 0.01 mm (100th mm).

0.01 mm Graduation


SLEEVE
THIMBLE
READING LINE

When reading a metric micrometer, the sleeve scale has an upper and lower part. Each revealed line on the upper scale represents 1.00 mm, and each line on the lower scale represent 0.50 mm past the last upper line. The thimble divisions each represent 0.01 mm.

To read a metric micrometer, follow these steps:

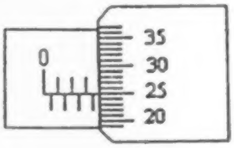
STEP 1: Read the largest mark visible on the upper sleeve. This is the number of whole millimeters.

STEP 2: If an additional line is visible on the lower sleeve, add 0.50 mm.

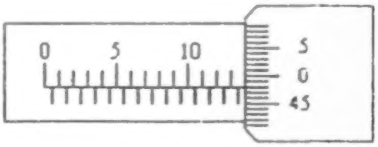
STEP 3: Read the number on the thimble scale, and add this to the total from steps 1 and 2.

Practice by reading these metric micrometers.

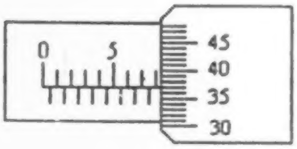
1.



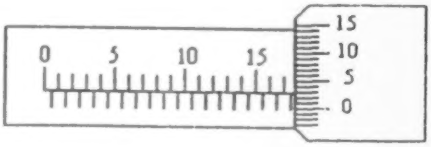
2.



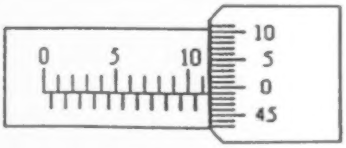
3.


0
5
45
40
35
30

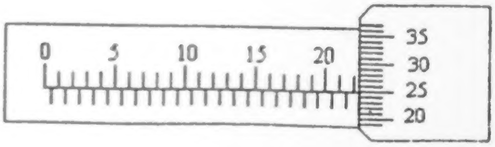
4.


0
5
10
15
15
10
5
0

5.


0
5
10
10
5
0
45

6.


0
5
10
15
20
35
30
25
20

MEASURING LENGTH

1. Measure the following lines to the nearest 16th inch, and record your answers below.

   a.

   b.

   c.

   d.

	16th(fraction)	16th(decimal)	100th	cm
a.				
b.				
c.				
d.				

2. Change each of these measures to decimals, and record.

3. Remeasure each line to the nearest 100th inch and record as a decimal number. How do these measures compare to the first measures? Which set of measures has more decimal places? Which set is more accurate? Comment on changing lengths measured in 16ths to decimal form.

4. Remeasure each line to the nearest tenth of a centimeter and record.

5. If time permits, measure each of the following in units of your choice using an appropriate measuring devise.

   a. Width, length, and height of this table.

   b. Width and height of the chalkboard.

   c. Width and height of the doorway.

   d. Height of the ceiling.

VOLTMETER

You will be reading the DC Voltage of several batteries.

There are two scales marked DC Voltage on this meter.

The top scale reads a maximum of five volts. What does each subdivision represent on this scale?

____

The bottom scale reads a maximum of 15 volts. What does each subdivision represent on this scale?

____

Do you see how to switch the meter from reading one scale to the other?

1. Measure the voltage of batteries A, B, C, D, E, and F as accurately as possible. Record these voltages. Discuss how well these voltages match with what you expected.

A ________ B ________ C ________ D ________ E ________ F ________

2. Check the voltage of one "flashlight" battery. Now check two of these batteries together. Now do 3, 4, and then 5. Record below, and discuss your observation.

1 ________ 2 ________ 3 ________ 4 ________ 5 ________

3. With the five batteries together from above, turn on of the batteries "backwards", and record the new voltage. Try this with two batteries backwards, then three. Discuss your observations below.

4. If time permits, check the voltages from "1" with the multimeter.

ENGLISH MICROMETERS

1. Measure the thickness (height) and maximum outside diameter of the ceramic parts labeled A, B, C, and D. Make measurements to the nearest .001 inch. Record answers below.

	THICKNESS (HEIGHT)	OUTSIDE DIAMETER
A	____________	____________
B	____________	____________
C	____________	____________
D	____________	____________

2. Measure the thickness of each of the wires to the nearest .0001 inch, and record below.

WIRE	DIAMETER	GAUGE
A	____________	____________
B	____________	____________
C	____________	____________
D	____________	____________
E	____________	____________
F	____________	____________

3. Using the chart on the other page, determine the gauge of each wire, and record this information in the above chart.

DIMENSIONS, WEIGHT AND RESISTANCE OF PURE COPPER WIRE

Gauge No. A.W.G.	Dia. In.	Area Circular Mils (d²) 1 Mil = .001 In.	Lb per 1000 Feet Bare Wire	Length Feet per Lb	Resistance at 77°F Ohms per 1000 Ft
STRANDED	1.151	1000000.	3090	3235	0108
	1.029	800000.	2470	4024	0135
	.963	700000.	2160	4628	0154
	.891	600000.	1850	5400	0180
	.814	500000.	1540	6488	0216
	.726	400000.	1240	8060	0270
	.574	250000.	772	1.30	0431
0000	.4600	211600.	640.5	1.56	0490
000	.4096	167800.	507.9	1.97	0618
00	.3648	133100.	402.8	2.48	0871
0	.3249	105500.	319.5	3.13	0983
1	.2893	83690.	253.3	3.95	.1239
2	.2576	66370.	200.9	4.96	1563
3	.2294	52630.	159.3	6.28	1970
4	.2043	41740.	126.4	7.91	2485
5	.1819	33100.	100.2	9.98	3133
6	.1620	26250.	79.46	12.59	3951
7	.1443	20820.	63.02	15.87	.4982
8	.1285	16510.	49.98	20.03	6282
9	.1144	13090.	39.63	25.23	.7921
10	.1019	10380	31.43	31.82	9989
11	.09074	8234.	24.92	40.12	1.260
12	.08081	6530.	19.77	50.59	1.588
13	.07196	5176.	15.68	63.80	2.003
14	.06408	4107.	12.43	80.44	2.525
15	.05707	3257.	9.86	101.4	3.184
16	.05082	2583.	7.82	127.9	4.016
17	.04526	2048.	6.20	161.3	5.064
18	.04030	1624.	4.92	203.4	6.385
19	.03589	1288.	3.90	256.5	8.051
20	.03196	1022.	3.09	323.4	10.15
21	.02846	810.1	2.45	407.8	12.80
22	.02535	642.4	1.95	514.2	16.14
23	.02257	509.5	1.54	648.4	20.36
24	.02010	404.0	1.22	817.7	25.67
25	.01790	320.4	.970	1031.0	32.37
26	.01594	254.1	.769	1300.0	40.81
27	.01420	201.5	.610	1639.0	51.47
28	.01264	159.8	.484	2067.0	64.90
29	.01126	126.7	.384	2607.0	81.83
30	.01003	100.5	.304	3287.0	103.2
31	.00893	79.70	.241	4145.0	130.1
32	.00795	63.21	.191	5227.0	164.1
33	.00708	50.13	.152	6591.0	206.9
34	.00631	39.75	.120	8310.0	260.9
35	.00562	31.52	.095	10480.0	329.0
36	.00500	25.00	.076	13210.0	414.8

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METRIC MICROMETERS

1. Measure the thickness of a penny, nickel, dime, and quarter with the standard metric micrometer. Record below.

PENNY __________

NICKEL __________

DIME __________

QUARTER __________

2. Measure the diameter of the penny, nickel, dime, and quarter with the standard metric micrometer. Record below.

PENNY __________

NICKEL __________

DIME __________

QUARTER __________

3. Measure the diameter of the penny, nickel, dime, and quarter with the calipers. Record below.

PENNY __________

NICKEL __________

DIME __________

QUARTER __________

4. Were the measures the same in "2" and "3" above? Why or why not?

5. If time permits, calculate the volume of the quarter. Remember, volume = area x height.

STATISTICS

Statistics is the science dealing with the:

1. **collection,**
2. **organization,**
3. **analysis, and**
4. **interpretation of numerical data.**

Collection of data is the process of obtaining measurements or counts.

Organization of data is the task of presenting the collected measurements or counts in a form suitable for deriving logical conclusions.

Analysis of data is the process of extracting relevant information from these measurements or counts, from which a summary can be formulated.

Interpretation of data is the task of drawing conclusions from the analysis of the data. *Usually this involves the formulation of predictions concerning a large collection of objects from information available for a small collection of similar objects - that is, a* ***sample****.*

An alternate definition of statistics is:

> **Statistics is a science that deals with problems capable of being answered by numerical information.**

In approaching the study of statistics, it is important to realize that no statistical procedure can, in itself, insure against mistakes, inaccuracies, faulty reasoning, or incorrect conclusions. The original data must be accurate, the methods must be properly applied, and the results must be interpreted properly.

Clear and forceful presentation is an important aid to the understanding and correct interpretation of data.

One method involves a summarized presentation of the numbers themselves, usually in tabular form - that is, **a table**.

The other consists in presenting the quantitative data in pictorial form - that is, **a graph**. A graph is a pictorial representation made for the purpose of studying changes in a single variable (i.e. a measurable characteristic) or comparing several similar or related variables. *To be effective, a graph should be simple and should emphasize the significant aspects of the data.*

So far, we have examined several measures of the center of a distribution. It is also important to know the extent to which the data vary from this central point.

DEFINITION: A numerical value indicating the amount of scatter about a central point is called a **measure of dispersion**.

We will examine three measures of dispersion: the range, the average deviation, and the standard deviation.

The **range** of a set of data is the difference between the largest and the smallest values.

For a set of values whose mean is m, the **average deviation** is

$$A_d = \frac{\sum |x_i - m|}{n}$$

For a set of numbers whose mean is m, the **standard deviation**, denoted σ, is

$$\sigma = \sqrt{\frac{\sum (x_i - m)^2}{n}}$$

The square of the standard deviation (that is, the value prior to taking the square root in the above formula) is called the **variance** of the distribution.

Relative merits of the measures of dispersion

The **range** is the easiest of these measures to understand, but it depends solely on extreme values, which may be coincidental, and tells nothing of the distribution, or concentration about the center.

The **average deviation** is easy to understand, and uses all data points, giving due weight to extreme values. However, it is unsuitable for algebraic manipulation since the sign of some differences must be adjusted while calculating. Also, when the mean deviation for two sets of data is known, the mean deviation for the combined set cannot be calculated.

The **standard deviation** is the most widely used measure of dispersion in dealing with statistics. It is particularly suitable for machine calculations. Although not as understandable as the average deviation, it has all of its other advantages, plus it is suitable for algebraic work.

Consider the following quiz scores:

5 8 6 4 2 4 10 8 8 5

For the above scores, determine the mean, median, mode, range, average deviation, standard deviation, and variance.

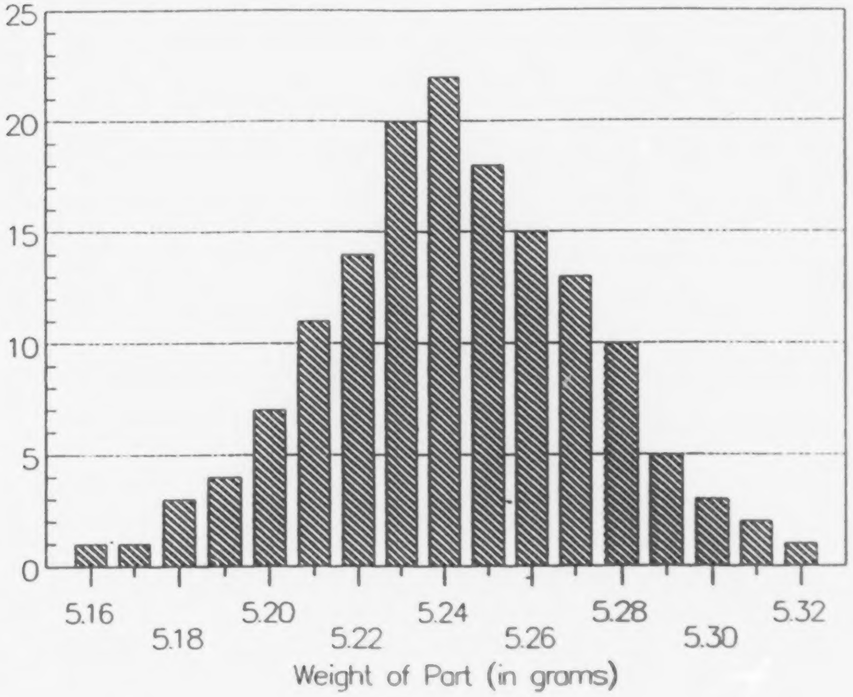
Consider the following weights of 150 parts number D123456.

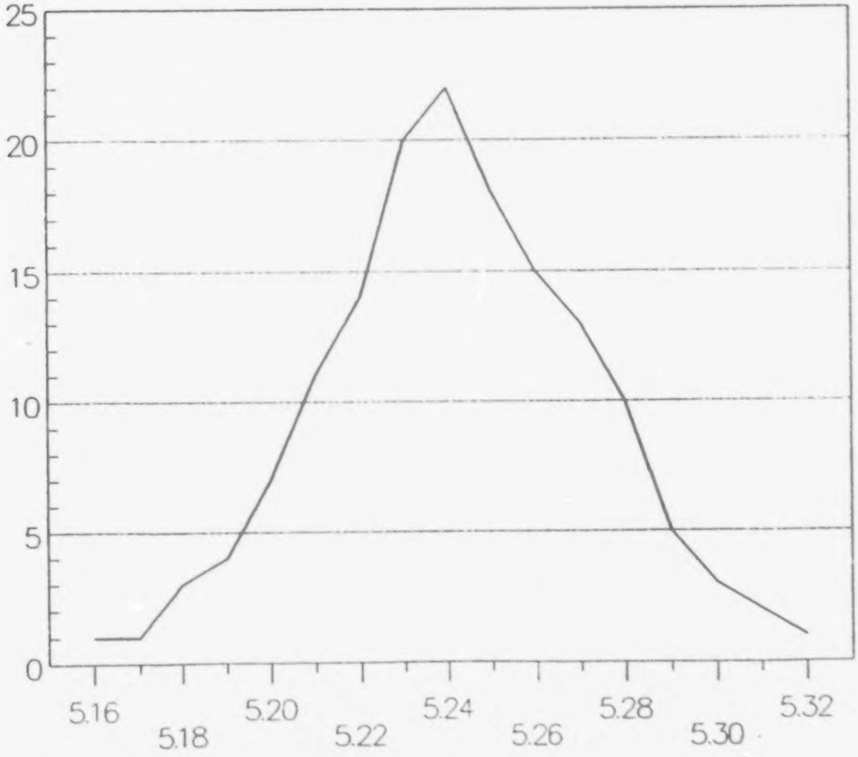
5.24 g	5.16 g	5.23 g	5.29 g	5.25 g	5.23 g	5.20 g	5.26 g	5.19 g	5.23 g
5.20 g	5.24 g	5.26 g	5.27 g	5.23 g	5.25 g	5.23 g	5.25 g	5.28 g	5.24 g
5.18 g	5.21 g	5.25 g	5.24 g	5.21 g	5.24 g	5.31 g	5.27 g	5.29 g	5.26 g
5.22 g	5.25 g	5.21 g	5.26 g	5.25 g	5.18 g	5.26 g	5.27 g	5.24 g	5.25 g
5.27 g	5.26 g	5.26 g	5.22 g	5.27 g	5.22 g	5.19 g	5.23 g	5.28 g	5.23 g
5.24 g	5.21 g	5.22 g	5.21 g	5.23 g	5.26 g	5.28 g	5.25 g	5.23 g	5.29 g
5.31 g	5.25 g	5.27 g	5.28 g	5.20 g	5.24 g	5.22 g	5.26 g	5.20 g	5.24 g
5.23 g	5.27 g	5.23 g	5.23 g	5.30 g	5.25 g	5.26 g	5.25 g	5.27 g	5.21 g
5.25 g	5.24 g	5.19 g	5.22 g	5.27 g	5.17 g	5.24 g	5.24 g	5.22 g	5.28 g
5.27 g	5.25 g	5.32 g	5.24 g	5.29 g	5.23 g	5.27 g	5.20 g	5.28 g	5.24 g
5.24 g	5.22 g	5.20 g	5.28 g	5.28 g	5.26 g	5.23 g	5.30 g	5.22 g	5.25 g
5.19 g	5.22 g	5.21 g	5.23 g	5.24 g	5.27 g	5.28 g	5.23 g	5.23 g	5.27 g
5.23 g	5.26 g	5.24 g	5.25 g	5.28 g	5.25 g	5.18 g	5.26 g	5.26 g	5.23 g
5.21 g	5.24 g	5.26 g	5.24 g	5.21 g	5.25 g	5.22 g	5.25 g	5.24 g	5.20 g
5.22 g	5.21 g	5.23 g	5.30 g	5.24 g	5.22 g	5.29 g	5.24 g	5.21 g	5.22 g

FREQUENCY TABLE

PART NUMBER D123456	
WEIGHT OF PART	NUMBER
5.16 grams	1
5.17 grams	1
5.18 grams	3
5.19 grams	4
5.20 grams	7
5.21 grams	11
5.22 grams	14
5.23 grams	20
5.24 grams	22
5.25 grams	18
5.26 grams	15
5.27 grams	13
5.28 grams	10
5.29 grams	5
5.30 grams	3
5.31 grams	2
5.32 grams	1
TOTAL	150

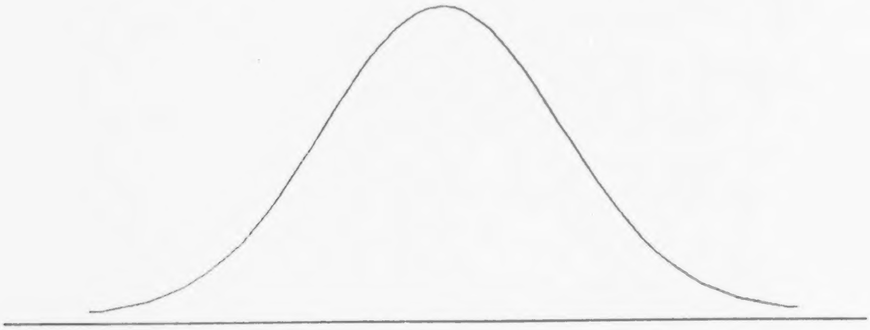
Histogram Showing Variation Among Parts #D123456





THE NORMAL FREQUENCY DISTRIBUTION CURVE

Recall that the Normal Curve, also called the bell curve or Gaussian curve, is the symmetrical curve pictured below.



The value represented by the highest point of the curve is the mean, median and the mode of the distribution of values represented by the curve.

The normal curve has been found to describe the frequency of occurrence of many factors with a high degree of accuracy:

- intelligence measures
- heights of a large group
- business data
- achievement scores
- weights of a large group
- economic data
- characteristics of manufactured products.

If we lay off a distance of one standard deviation on each side of the mean, we would enclose 68.26% of the area under the curve, and we can say that 68.26% of the items we are examining are within this area. Similarly, 95.44% of the items are within two standard deviations of the mean, and 99.72% of the items are within three standard deviations of the mean.

There exist tables that can be used to determine the probability of occurrence of any value in the distribution given the number of standard deviations we are from the mean.

EX 1: Consider IQ scores to follow a normal distribution with a mean of 100 and a standard deviation of 15. What range of IQ scores would include the middle 68% of the population? the middle 95%? the middle 99.7%?

EX 2: Consider the amount of weight gained during a three week period by a group of animals on a certain ration. If this weight gain is normally distributed with a mean of 25 lb and a standard deviation of 3 lb, what percent of the animals would we expect to gain at least 22 lb during a three week period?

EX 3: If the OD of part D123456 is normally distributed with $\mu = 1.500$ in and $\sigma = 0.025$ in, and if the tolerance for this measure is 1.500 ± 0.050 in, what percent of the parts produced can we expect to be outside the tolerance range?

In order to reduce a mass of data to an understandable form, we can construct a frequency table, or draw an appropriate graph representing the data.

It is useful to simplify the presentation even further by using certain measures that describe important features of the distribution.

DEFINITION: Any measure indicating a center of the distribution is called a **measure of central tendency**, or an average.

There are many measures of central tendency. We will work on finding values to represent the following:

The **arithmetic mean** of a set of data, denoted **m**, or $\bar{x}$, can be found by dividing the sum of all data values by the number of such values. That is

$$\bar{x} = \frac{\Sigma x_i}{n}$$

The **median** of a set of data arranged in order of magnitude is the middle value, or the mean of the two middle values.

The **mode** of a set of data is that value which occurs with the greatest frequency. The mode may not exist, or there may be more than one mode.

A **weighted mean** is an average found by giving a higher "weight" to more important, or more relevant values, and a lower "weight" to the lesser values.

Relative merits of the mean, median and mode

The **mean** is the most commonly used of these measures of central tendency. It is easy to compute, takes all values into consideration, and is well designed for algebraic manipulation. Also, given the means of two or more groups, an overall mean can be calculated. *Reliability in sampling is the chief merit of the mean.*

One potential advantage of the **median** is that it is not influenced by extreme values - this is especially important in economic statistics. The median can still be calculated when the magnitude of extreme values is not given, but when their number is known.

The **mode** is the least important and the least used of these three measures because of its ambiguity. Its merits include that it is easily understood, and that it is not influenced by extreme values.

DIAMONITE 2000
MATH POSTTEST

The following problems represent a posttest to see what math skills you have learned in training. You may use a calculator.

Do the best that you can in answering the problems with the knowledge that you possess - do not get help from other people to do these problems. You may refer to the handouts distributed in class, but don't try to learn procedures that were not picked up during training.

Thank you for your cooperation.

Good luck!

1. $\frac{7}{8} + \frac{1}{4} + \frac{11}{16} =$

2. Change $\frac{3}{16}$ to its decimal equivalent.

3. The allowable length of a part is marked as 1.322 ± .005 inches. What are the **minimum** **and** **maximum** allowable lengths for this part?

4. Of 2250 ceramic parts produced this morning, 6.4% were defective, how many parts were defective?

5. Of the 81 parts produced on third shift in E & S on 5/21/93, 6 were outside the tolerance range and had to be reworked. What percent of the parts needed to be reworked?

6. The allowable length (inches) of a part is marked as $5.300 \begin{matrix} +\ 2\% \\ -\ 3\% \end{matrix}$
What are the **minimum** **and** **maximum** allowable lengths for this part?

7. The median of the numbers 15, 20, 8, 7, and 10 is
a. 10
b. 8
c. 12
d. 15

8. Two measures of dispersion are
a. the mean and the mode
b. the range and the standard deviation
c. the median and the range
d. the mean and the mean deviation.

9. In a normal curve, about what percent of the values are within one standard deviation of the mean?
a. 50.0%
b. 68.3%
c. 95.4%
d. 99.7%

10. The area of a rectangle measuring 3 ft by 5 inches is (show work)
a. 15 ft^2
b. 180 in
c. 1.25 ft^2
d. 20 ft^2

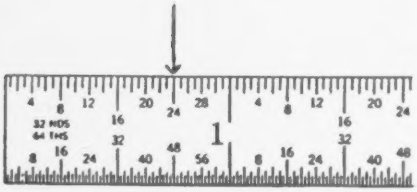
11. The metric prefixes meaning 1000, 1/100, and 1/1000 are
a. mega, hecto, and centi
b. kilo, hecto, and deka
c. deci, centi, and milli
d. kilo, centi, and milli

12. Given V = Ah, where A = 26 in^2 and h = 5.0 in, then V is
    a. 130 in^3
    b. 5.2 in
    c. 5.2 liters
    d. 130 in^2

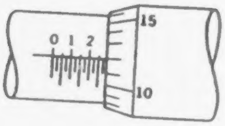
13. If 90 ft/min is changed to inches/sec, the result is (show work)
    a. 90 inches/sec
    b. 1.5 inches/sec
    c. 1080 inches/sec
    d. 18 inches/sec

Read each of the following:

14. ________________


4
8
12
16
20
24
28
1
4
8
12
16
20
24
32 NDS
64 THS
32
8
16
24
40
48
56
8
16
24
32
40
48

15. 1.________ inches (1 to 2 micrometer)



Diamonite 2000

Mathematics Instruction for Salaried Employees

© 1994
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Agricultural Technical Institute
Wooster, Ohio

Diamonite 2000
Math Instruction for Salaried Employees

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The materials outlined in this manual were taught in three (3) two-hour class sessions, and one (1) one-hour class session for a total of seven (7) hours of instruction.

Class 1 - 2 hours of instruction and guided practice

Pages 6 through 10 of the manual were used as a reference as the instructor reviewed operations and application problems involving percent numbers. Problems on pages 11 and 12 of the manual were assigned for practice.

Units of measure from the Metric System and the United States Customary System were outlined and discussed. Pages 13 through 20 were assigned to be read to reinforce understanding of the Metric System.

Objectives for class 1:

The student will be able to...

- Find a percent of a number.
- Increase or decrease a value by a given percent.
- Solve application problems involving percent of a whole, percent increase, or percent decrease.
- State the minimum and maximum allowable values when given a measurement with a tolerance stated in terms of a percent.
- Discuss units of measure in the United States Customary System.
- Discuss units of measure in the Metric System.

Class 2 - 2 hours of instruction and guided practice

Conversion from one unit of measure to another was discussed using the process usually referred to as "Unit Analysis" as described on pages 23 and 24. The conversion factors on pages 21 and 22 of the manual were reviewed, and used in several sample problems. The problem set on page 25 was assigned for practice.

Evaluation of formulas was demonstrated with emphasis on correct rounding and determination of the final units of measure. The problem set on page 25 was assigned for practice with this procedure.

Pages 26 through 30 of the manual were used as a reference as the instructor reviewed angle measurement and area for plane figures. Page 31 of the manual was assigned for practice.

Objectives for class 2:

The student will be able to...

- Convert from one unit of measure to another.
- Use a given formula to calculate an unknown value.
- Find the area of a standard or composite 2-D figure.

Class 3 - 2 hours of instruction and guided practice

Pages 32 through 34 of the manual were used as a reference as the instructor reviewed volume for space figures. Page 35 of the manual was assigned for practice.

Pages 36 through 41 were used as reference in reviewing some basic statistical ideas. Calculations for the mean, median, mode, range and standard deviation were made. The normal curve (page 43) was introduced.

Objectives for class 3:

The student will be able to...

- Find the volume of a standard or composite 3-D figure.
- Explain in basic terms the statistical concepts of mean, standard deviation, and the normal curve.

Class 4 - 1 hour of instruction and guided practice

Various probabilities involving the normal curve were calculated using data from the table on page 43.

Sampling and the distribution of sample means were discussed using page 44 of the manual as a reference. Probabilities involving sample means were calculated using the table on page 43 to obtain the necessary z scores.

Objectives for class 4:

The student will be able to...

- Find any area under the standard normal curve, and use this to determine the probability of a given occurrence.

- Calculate the mean and standard deviation of a normal distribution of averages from a given normal distribution of individual items.

CITATIONS

Pages 13-19, 21-22, 31 and 35 of the manual were used with permission, and are from

Miller, Emil, and Linda Barbu, Basic Mathematics with Applications in Agriculture, OSU/ATI, 1991.

Page 20 of the manual is from

Ewen, Dale, and Michael A. Topper, Mathematics for Technical Education, Prentice-Hall, Inc., 1983.

Pages 26 through 29 of the manual were used with permission, and are from

Stopa, Richard J., Basic Skills in Mathematics - Geometry: Lesson sheets in Blackline for Photocopying, Opportunities for Learning, Inc., 1980.

I. COURSE ORGANIZATION

The Diamonite 2000 math instruction for salaried employees will consist of three (3) two-hour class sessions, for a total of 6 hours of instruction.

II. COURSE DESCRIPTION

The course will include a review of percents and measurement, an overview of geometry concepts for two and three dimensional figures, and an overview of statistics.

III. COURSE OBJECTIVES

The student will be able to:

A. Apply reviewed strategies to solve percent problems involving an increase, a decrease, or a part of a whole.
B. Work with units of measure to make conversions or solve formulas.
C. Find the area of a 2-D figure, or the volume of a 3-D figure.
D. Explain the statistical concepts of mean, standard deviation, and the normal curve.
E. Determine the probability of obtaining a sample mean, given a population's mean and standard deviation.

IV. COURSE CONTENT

A. Percents
    1. Basic percent problems: rate x base = part
    2. Percent increase/decrease problems
    3. Solving applied problems
B. Measurement
    1. Overview
        a. The English System
        b. The Metric System
    2. Converting between units
    3. Working with formulas
C. Basic Geometry
    1. Overview of angles
    2. Two-dimensional figures
        a. Polygons
        b. Circles
        c. Composite figures
    3. Three-dimensional figures
        a. Prisms and cylinders
        b. Pyramids and cones
        c. Spheres and hemispheres
        d. Composite figures
D. Overview of statistics
    1. Organization of data
    2. Measures of central tendency
    3. Measures of dispersion
    4. The normal curve
    5. Statistics of sampling

DIAMONITE 2000

Math Instruction - Salaried
Competency Skills

The student will be able to:

1. Find a percent of a number.
2. Increase or decrease a value by a given percent.
3. Solve application problems involving percent of a whole, percent increase, or percent decrease.
4. Convert from one unit of measure to another.
5. Use a given formula to calculate an unknown value.
6. Find the area of a standard or composite 2-D figure.
7. Find the volume of a standard or composite 3-D figure.
8. Explain the statistical concepts of mean, standard deviation, and the normal curve.
9. Find any area under the standard normal curve, and use this to determine the probability of a given occurrence.
10. Calculate the mean and standard deviation of a normal distribution of averages from a given normal distribution of individual items.

DIAMONITE 2000

MATH PRETEST

The following problems represent a pretest to see what math skills you possess coming into training. You may use a calculator.

Do the best that you can in answering the problems with the knowledge that you currently possess - do not get help from other people to do these problems.

We will have a similar test at the end of training to determine the effectiveness of the training, and the amount of material that you have retained.

Thank you for your cooperation.

Good luck!

1. The 1,980 ceramic parts #D25332 produced this morning represent a 12% decrease in production from yesterday. What was yesterday's production?

2. Of the 81 parts produced on third shift in E & S on 5/21/93, 6 were outside the tolerance range and had to be reworked. What percent of the parts needed to be reworked?

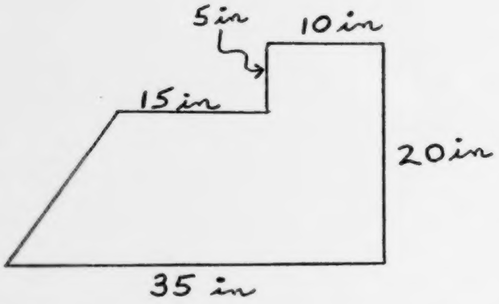
3. The allowable length (inches) of a part is marked as 5.300 $^{+2\%}_{-3\%}$ What are the **minimum and maximum** allowable lengths for this part?

4. It is reported that 360 parts (number D11836) were produced on third shift, and this represented 12.5% of the total parts of this type produced on 3/16/93. What was the total number of D11836 parts produced on this date?

5. The area of a rectangle measuring 3 ft by 5 inches is (show work)
   a. 15 ft^2
   b. 180 in
   c. 1.25 ft^2
   d. 20 ft^2

6. A certain cylinder has a height of 5.0 inches. The area of the circular base is 26 in^2. The Volume of this cylinder would be
   a. 130 in^3
   b. 5.2 in
   c. 5.2 liters
   d. 130 in^2

7. Find the area of the figure drawn at the right.



8. The metric prefixes meaning 1000, 1/100, and 1/1000 are
   a. mega, hecto, and centi
   b. kilo, hecto, and deka
   c. deci, centi, and milli
   d. kilo, centi, and milli

9. If 90 ft/min is changed to inches/sec, the result is (show work)
   a. 90 inches/sec
   b. 1.5 inches/sec
   c. 1080 inches/sec
   d. 18 inches/sec

10. Given $F = \frac{mv^2}{r}$, where m = 25 kg, r = 125 m, and

v = 11 m/sec, find F. Be sure to label properly!

11. The median of the numbers 15, 20, 8, 7, and 10 is
    a. 10
    b. 8
    c. 12
    d. 15

12. Two measures of dispersion are
    a. the mean and the mode
    b. the range and the standard deviation
    c. the median and the range
    d. the mean and the mean deviation.

13. In a normal curve, about what percent of the values are within one standard deviation?
    a. 50%
    b. 68%
    c. 95%
    d. 99%

For questions 14 and 15:

If the distribution of individual weights for a part forms a normal curve with mean 20.0 g and standard deviation 5.00 g, the distribution of sample averages will also follow a normal curve.

14. If the size of each sample that is averaged is four (4) parts, what would be the mean of the distribution of averages?
    a. 20.0 g
    b. 5.0 g
    c. 10.0 g
    d. There is not enough information to determine this mean.

15. If the size of each sample that is averaged is four (4) parts, what would be the standard deviation of the distribution of averages?
    a. 5.00 g
    b. 1.25 g
    c. 2.50 g
    d. There is not enough information to determine this standard deviation.

PERCENTS

The word **PER-CENT** means **per 100** or **out of 100**. Since the word **per** implies a division, "per 100" means **÷ 100**.

So: 7% means 7 out of 100, or 7 ÷ 100;

14% means 14 out of 100, or 14 ÷ 100;

3.6% means 3.6 out of 100 or 3.6 ÷ 100.

To change a percent to a decimal or fraction, we will use the idea that per-cent means ÷ 100.

$7\% = \frac{7}{100}$ (fraction) $= 7 \div 100 = 0.07$ (decimal)

$14\% = \frac{14}{100} = \frac{7}{50}$ (fraction) $= 14 \div 100 = 0.14$ (decimal)

$3.6\% = \frac{3.6}{100} = \frac{36}{1000} = \frac{9}{250}$ (fraction) $= 3.6 \div 100 = 0.036$

To change a decimal or a fraction to a percent, we will multiply by 100, and attach a percent sign to the number. (Since a fraction or decimal represents a part of one thing, and a percent represents a part of one hundred things, we multiply by 100)

$0.42 = 0.42(100)\% = 42\%$

$0.047 = 0.047(100)\% = 4.7\%$

$\frac{4}{5} = \frac{4}{5}(100)\% = \frac{400}{5}\% = 80\%$

To interpret information involving percents, use the idea that per-cent means out of each 100.

"In Wayne county, 28% of all children are preschoolers" *means* that 28 out of each 100 children are preschoolers.

"Each week, 15% of Ohioans purchase a lottery ticket" *means* 15 out of each 100 Ohioans buy a ticket.

"25% of the class was absent today" *means* 25 out of each 100 students were absent.

In the above examples, suppose there are 42,350 children in Wayne County, suppose there are 10,200,000 Ohioans, and suppose that there are 40 people in the class. Can we come up with actual numbers from the above percents?

CALCULATING WITH PERCENTS

To find a percent of a given quantity, multiply the decimal equivalent of the percent times the quantity.

28% of 42,350 children = 0.28(42,350) = 11,858 children.

15% of 10,200,000 Ohioans = 0.15(10,200,000) = 1,530,000 Ohioans.

25% of 40 class members = 0.25(40) = 10 students absent.

6% tax on a $234.50 purchase = 6% of $234.50
= 0.06(234.50) = $14.07 tax.

WORKING PROBLEMS INVOLVING PERCENTS

In problems involving percents, including the type listed above, often we can think of the problem as having three parts: the percent number, the amount of (or count of) the part of interest, and the total amount (or total count).

The following problems fit into this category:

1. Of 350 ceramic parts produced on the 27-33 press this morning, 6% were defective, how many parts were defective?

2. Of the 178 parts produced in E & S for Unison Industries, 11 were outside the tolerance range and had to be reworked. What percent of the parts needed to be reworked?

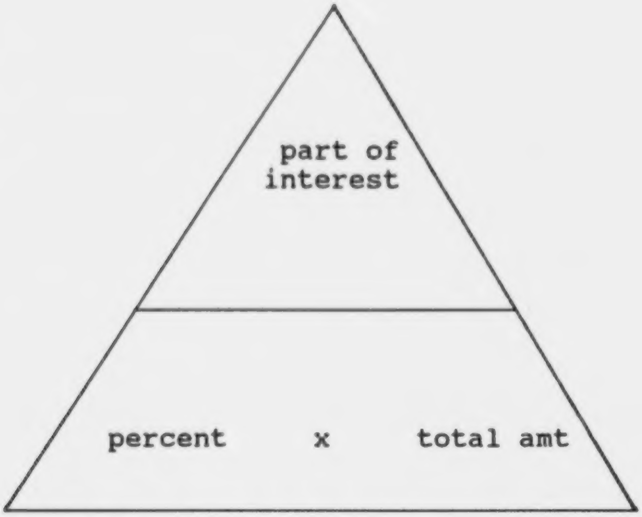
3. It is reported that 3600 parts (number D11836) were produced on third shift, and this represented 12.5% of the total parts of this type produced on 3/16/93. What was the total number of D11836 parts produced on this date?

In the first problem, we are "interested" in the defective parts. The percent defective is 6%, the number of defective parts is unknown, and the total number of parts is 350.

In the second problem, we are "interested" in the parts needing reworking. The percent needing reworked is unknown, the number of parts needing reworked is 11, and the total number of parts is 178.

In the third problem, we are "interested" in the third shift production. The percent from third shift is 12.5%, the number from third shift is 3600 parts, and the total number is unknown.

For each of these problems, we can use the triangle below to help find the unknown value.



Cover up the value you are looking for, and follow the directions given.

For problem 1, cover up the part of interest, and take the % x the total amt = .06 x 350 parts = 21 parts defective.

For problem 2, cover up the %, and take the part of interest ÷ total amt = 11 ÷ 178 = 6.2% need reworked.

For problem 3, cover up the total amt, and take the part of interest ÷ % = 3600 ÷ 0.125 = 28,800 parts.

PROBLEMS INVOLVING AN INCREASE/DECREASE BY A PERCENT

In some situations, the percent number we are working with represents the amount of increase or decrease that has taken place.

EXAMPLES:

1. A 20% discount is available on a purchase if payment is made in the first 10 days. The bill is for $2540.62. How much should we pay if we pay in the first 10 days?

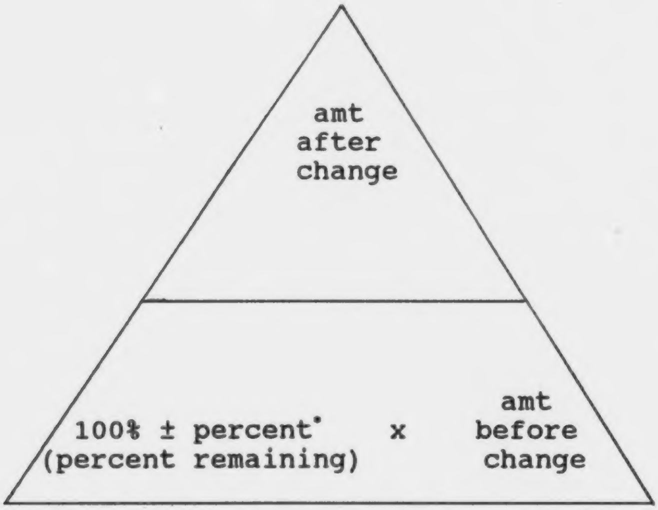
2. You are to receive a 4% raise. Your present salary is $35,600 per year. What will be your new yearly pay?

3. Production of part D22171 has decreased 8% since last year. This year 5,267 of these parts are being produced per month. What was last year's monthly production?

4. Your current property tax bill includes an increase of 13%. The bill is for $511.23. What was the amount of the last bill?

5. Last month's gross profit on part number D11111 was $8550. This month's gross profit on the same part is $9250. By what percent did the gross profit increase?

For each of these problems, we can use the triangle below to help find the unknown value.


amt after change
100% ± percent*
(percent remaining)
x
amt before change

Cover up the value you are looking for, and follow the directions given.

* If something has **decreased** by 8%, then only **92%** remains (100% - 8%). If something has **increased** by 8%, then it is **108%** as big as it used to be (100% + 8%).

If this procedure is followed for the examples on the previous page, the following answers will be obtained.

1. $2032.50;
2. $37,024;
3. 5725 parts per month;
4. $452.42;
5. 8.2% increase.

PRACTICE PROBLEMS

1. **Change to reduced fractions:**

a. 14% = b. 25% = c. 36% =

2. **Change to decimals:**

a. 32% = b. 6.4% = c. 5% =

3. **Change to percents:**

a. 0.335 = b. 0.024 =

c. $\frac{3}{4}$ = d. $\frac{7}{8}$ =

4. **Solve the following percent problems:**

a. 3.5% of the parts produced on press 30-22 were rejected yesterday. If 3750 parts were produced, how many were rejected?

b. Of the 280 Diamonite employees, 60 are salaried workers. What percent of the employees at Diamonite are salaried? (NOTE: Numbers are approximate)

c. On 4/22/93, E & S had only 42 pieces that were outside the tolerance limits. If these 42 pieces represent 3% of the pieces produced, how many pieces were produces in E & S on this date?

d. A test piece is found to measure 2.035 inches in diameter prior to drying, and 1.722 inches in diameter after drying. By what percent has the test piece shrunk?

e. A test piece is found to shrink 40% when dried. If the wall thickness of the piece measures 0.124 inches after drying, what was the wall thickness prior to drying?

5. Complete the following table:

	MINIMUM LENGTH	MAXIMUM LENGTH
a. 2.250 in - 2%		
b. 6.300 in $^{+3\%}_{-2\%}$		

ANSWERS:

1a. $\frac{7}{50}$; b. $\frac{1}{4}$; c. $\frac{9}{25}$;

2a. 0.32 ; b. 0.064 ; c. 0.05 ;

3a. 33.5% ; b. 2.4% ; c. 75% ; d. 87.5% ;

4a. 131 rejected ; b. 21.4% salaried ; c. 1400 pieces ;

d. 15.38% ; e. 0.207 inches.

5a. 2.205 - 2.250 inches;

b. 6.174 - 6.489 inches.

THE METRIC SYSTEM

The standard unit of length in the metric system is the meter, which is about 40 inches long. Using the meter, we can obtain the standard unit for volume, the liter, which is about the size of a quart, and the standard unit for mass, the gram, which is about twice the mass of a standard paper clip.

Rather than have completely different names for units larger or smaller than these standard units as in the English system, the metric system makes use of standard prefixes which, when attached to the basic unit, name larger or smaller units of measurement.

These metric prefixes have power of ten meanings to avoid numerous zeroes or the use of scientific notation. The more common prefixes appear below with their abbreviation and their numerical meaning. The **bold** prefixes are ones that you should know.

giga(G):	1,000,000,000 or 10^9	deci (d):	0.1 or 10^{-1}
mega (M):	1,000,000 or 10^6	**centi (c):**	0.01 or 10^{-2}
kilo (k):	1,000 or 10^3	**milli (m):**	0.001 or 10^{-3}
hecto (h):	100 or 10^2	**micro (μ):**	0.000001 or 10^{-6}
deka (da):	10 or 10^1	nano (n):	0.000000001 or 10^{-9}

Certainly, it would be no major project to learn these prefixes, and thus obtain a basic understanding of the metric system. In actual use of the metric system, not all of these prefixes are commonly used with each of the basic units. The following section outlines the common units of measure for length, mass and volume, giving approximate size and uses for each. While working through this section, you should try to "think metric". That is, you should "picture" lengths in meters and centimeters, for instance, rather than in feet and inches.

Length

Units of length in the metric system are derived from the standard length known as the meter. The meter is the appropriate unit for measuring the height of a building, the dimensions of a house or the lot it is built on, the length of a section of rope, or the distance from home plate to the fence on a baseball field. A meter is about 40 inches long.

EXAMPLES:

a) A football field is about 90 m from goal line to goal line.

b) The height of a room is usually between 2½ and 3 meters.

c) A small room might be 3 or 4 meters long and a large room might be 6 or 8 meters long.

Another commonly used unit for length in the metric system is the centimeter. A centimeter is about the width of one's small finger, and would be used to measure one's height, the length of your pencil, or book, or the distance around one's waist. One inch is about 2½ centimeters.

EXAMPLES:

a) Most people's heights are between 150 and 200 centimeters. 150 cm is about 4 ft 11 in and 200 cm is about 6 ft 7 in.

b) A new pencil is about 20 cm long.

c) A nickel is about 2 cm wide.

d) This page is 28 cm long.

A unit of measure even smaller than a centimeter is the millimeter. A millimeter is about the same as the thickness of a dime and would be used where fractions of an inch would normally be used.

EXAMPLES:

a) A ¼ in socket would be about 6 millimeters.

b) A honey bee would be between 10 and 15 mm long and the individual hive cells are about 5 mm wide.

c) A small bolt might be between 2 and 5 mm in diameter.

d) The thickness of a piece of plywood would be between 10 and 30 mm.

e) A man's ring might be 18 mm in diameter.

A unit of length used for large distances in the metric system is the kilometer, which is slightly more than one half of a mile. The kilometer is used on traffic signs, on road maps, in geography books, for Olympic bicycle races and to measure the distance to the moon.

EXAMPLES:

a) A 3 mi jogging track would be a little less than 5 kilometers.

b) The distance from Akron to Cleveland is about 80 km.

c) The distance from ATI to downtown Wooster is about 3 km.

Try to determine the choice which best describes the length of each of the following thinking metrically; there should be no need to convert to inches or miles!

____ 1. Width of a door
(a) 2 m (b) 80 cm (c) 10 cm

____ 2. Diameter of a penny
(a) 1.9 mm (b) 19 cm (c) 1.9 cm

____ 3. One hour drive on a highway
(a) 100 km (b) 10 km (c) 1000 m

____ 4. Width of a suburban street
(a) 15 mm (b) 150 m (C) 5 m

____ 5. Length of a paper clip
(a) 10 cm (b) 3 cm (c) 3 mm

____ 6. Width of a pencil
(a) 7 mm (b) 70 cm (c) 7 cm

____ 7. Height of a woman
(a) 16 m (b) 16 cm (c) 1.6 m

Volume - Capacity

In the metric system, units for measuring length and units for measuring volume are interrelated. The basic unit for volume in this system is the liter, which is defined as the amount of volume in one cubic decimeter (a cube 10 cm on each edge). The liter is slightly larger than a quart and is the unit for most everyday capacity measurements. Milk, pop, cider, paint thinner, and gasoline for your car would all be measured in liters.

EXAMPLES:

a) A gallon of milk is about 4 liters.

b) An 8-oz cup of coffee is about ¼ liter.

c) A 15 gallon gas tank (60 qt) is about 57 L.

d) A small aquarium might be about 20 L.

For measuring small volumes in the metric system, the milliliter is used. Doctors, druggists and scientists measure most liquids in milliliters. A milliliter has the same volume as a cubic centimeter (cc or cm^3), which is about 1/5 of a teaspoon.

EXAMPLES:

a) A flu shot might contain 5 milliliters of medicine.

b) A tablespoon of liquid is a little less than 15 ml.

c) A medicine bottle might contain 100 ml.

To measure large volumes in the metric system, the cubic meter (a cube 1 m long on each edge) is used. The cubic meter is equal in volume to 1000 liters and could also be called a kiloliter, although this is not commonly done. The cubic meter would be used to specify the volume of a room, a silo, or a quantity of sand, gravel or concrete.

EXAMPLES:

a) A normal size refrigerator would have a volume of ½ cubic meter.

b) A small room would have a volume of 20 or 30 cubic meters.

c) A trough for feeding hogs might contain 1 m^3.

Now try to determine the choice which best describes the volume of each of the following, thinking metrically.

____ 1. A bottle of pop
(a) 7 l (b) 700 ml (c) 70 ml

____ 2. A small room (9 ft x 12 ft)
(a) 40 m^3 (b) 400 m^3 (c) 4 m^3

____ 3. A bottle of aspirin
(a) 6 ml (b) 60 ml (c) 6 l

____ 4. A quart of oil
(a) 0.1 l (b) 1 l (c) 10 ml

____ 5. A gas tank
(a) 75 l (b) 75 ml (c) 7.5 m^3

____ 6. A box of cereal
(a) 2.5 ml (b) 25 ml (c) 2.5 l

____ 7. An eye dropper
(a) 1.5 ml (b) 1.5 l (c) .15 l

Weight - Mass

Units for weight or mass in the metric system are derived from the standard unit known as the gram. The gram is a very small unit of mass, defined to be the weight of 1 milliliter of water; this turns out to be about 0.002 lb. The gram would be used to measure the mass of an aspirin tablet, a can of soup, a package of cereal, a tube of toothpaste or a bar of soap.

EXAMPLES:

a) A paper clip has a mass of about ½ gram.
b) A nickel has a mass of about 5 grams.
c) A flashlight battery weighs about 100 g.
d) A stick of margarine weighs about 110 g.

A larger unit for measuring weight is the kilogram. The kilogram is the appropriate unit for measuring the weight of a person, a sack of flour, a bag of potatoes, or luggage at an airline counter. It is used where pounds are normally used and is a little over 2 lb on the earth's surface.

EXAMPLES:

a) Most people weigh between 50 kg and 100 kg (110 - 220 lb).
b) A small car weighs between 1000 kg and 1500 kg.
c) A desk telephone weighs about 1 kg.
d) A newborn baby usually weighs between 2 kg and 4 kg.
e) An unabridged dictionary would weigh between 3 and 5 kg.

To measure very small amounts of mass we have the milligram. This small unit of weight is used most often by the medical profession to measure drugs and medications.

EXAMPLES:

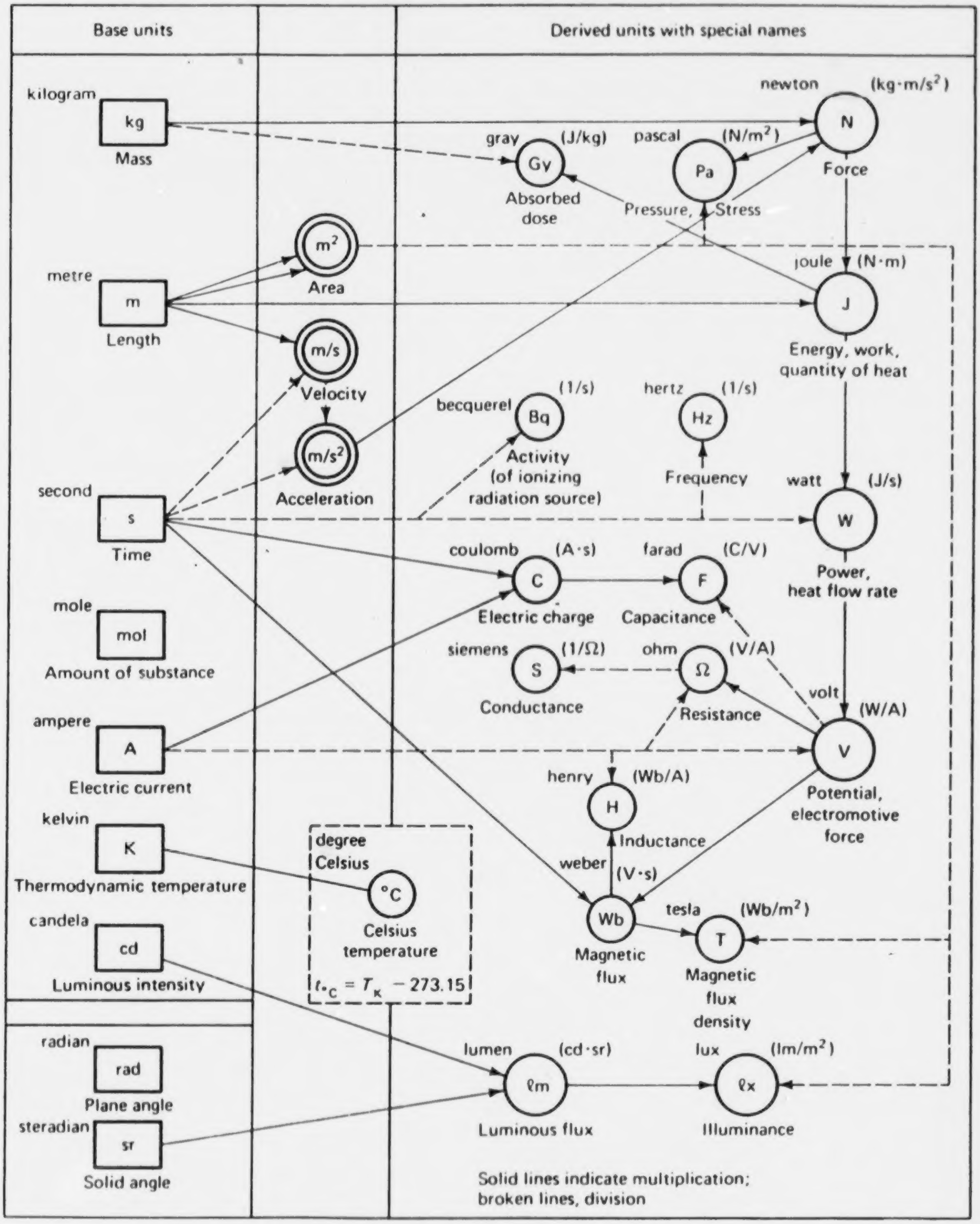
a) A vitamin C capsule would contain between 250 mg and 500 mg of vitamin C.
b) Some aspirin tablets contain 400 mg aspirin.
c) A common multivitamin capsule contains about 2 mg of vitamin B-2 (Riboflavin).
d) The U.S. recommended daily allowance of iodine is 25 mg.

Determine the choice which best describes the weight of each of the following thinking metrically.

____ 1. Can of soup
(a) 3 g (b) 35 g (c) 350 g
____ 2. Quart of milk
(a) 1 kg (b) 10 kg (c) 10 g
____ 3. Sugar cube
(a) 20 g (b) 2 g (c) 2 mg
____ 4. A small sack of sugar (5 lb)
(a) 5 kg (b) 1 kg (c) 2 kg
____ 5. A football player
(a) 110 kg (b) 11 kg (c) 1200 g
____ 6. A drop of water
(a) 50 g (b) 50 mg (c) 2 kg
____ 7. A common barbell set
(a) 50 kg (b) .5 kg (c) 450 kg

RELATIONSHIPS OF SI UNITS WITH NAMES

The chart below shows graphically how the 17 SI derived units with special names are derived in a coherent manner from the base and supplementary units. It was provided by the National Bureau of Standards.


Base units
Derived units with special names
kilogram
kg
Mass
metre
m
Length
second
s
Time
mole
mol
Amount of substance
ampere
A
Electric current
kelvin
K
Thermodynamic temperature
candela
cd
Luminous intensity
radian
rad
Plane angle
steradian
sr
Solid angle
m²
Area
m/s
Velocity
m/s²
Acceleration
degree Celsius
°C
Celsius temperature
$t_{°C} = T_K - 273.15$
newton (kg·m/s²)
N
Force
gray (J/kg)
Gy
Absorbed dose
pascal (N/m²)
Pa
Pressure, Stress
joule (N·m)
J
Energy, work, quantity of heat
becquerel (1/s)
Bq
Activity (of ionizing radiation source)
hertz (1/s)
Hz
Frequency
watt (J/s)
W
Power, heat flow rate
coulomb (A·s)
C
Electric charge
farad (C/V)
F
Capacitance
siemens (1/Ω)
S
Conductance
ohm (V/A)
Ω
Resistance
volt (W/A)
V
Potential, electromotive force
henry (Wb/A)
H
Inductance
weber (V·s)
Wb
Magnetic flux
tesla (Wb/m²)
T
Magnetic flux density
lumen (cd·sr)
ℓm
Luminous flux
lux (lm/m²)
ℓx
Illuminance

Solid lines indicate multiplication; broken lines, division

BEST COPY AVAILABLE

Since we live in a country which uses two systems of measurement, we need to deal with relationships between the English system and the metric system. Some conversion factors or equivalences will be convenient to use. I include here metric-metric, English-metric and English-English equivalences. This collection is not exhaustive, but includes the most frequently used relationships.

Metric - Metric Conversion Factors

Factors for Length

1 km = 1000 m

1 m = 100 cm

1 m = 1000 mm

Factors for Weight

1 kg = 1000 g

1 g = 1000 mg

1 metric ton = 1000 kg

Factors for Volume

1 kL = 1 m^3

1 kL = 1000 L

1 L = 1000 mL

1 mL = 1 cm^3 = 1 cc

Factors for Area

1 are = 100 m^2

1 hectare(ha) = 100 are

English - Metric Conversion Factors

Factors for Length

1 inch = 2.54 cm

1 meter ≈ 39.4 in

1 km ≈ .621 miles

Factors for Weight

(earth's surface)

1 lb ≈ 454 g

1 kg ≈ 2.20 lb

Factors for Volume

1 L ≈ 1.06 qt (liquid)

1 bushel ≈ 35.24 L

Factors for Force

1 lb ≈ 4.45 Newtons(N)

1 N ≈ 0.225 lb

Factors for Area

1 hectare(ha) ≈ 2.47 acres

Factors for Mass

14.6 kg ≈ 1 slug

English - English Conversion Factors

Factors for Length

1 foot = 12 inches
1 yard = 3 feet
1 mile = 5280 feet

1 rod = 16.5 feet
1 chain = 4 rods
1 mile = 8 furlongs

Factors for Weight

1 lb = 16 oz
1 ton = 2000 lb
1 long ton = 2240 lb

Factors for Area

1 acre = 43560 ft^2
1 sq mile = 640 acre
1 acre = 10 sq chains
1yd^2 = 9 ft^2
1ft^2 = 144 in^2

Factors for Volume

Liquid Measure

1 pt = 2 cups
1 qt = 2 pt
1 gal = 4 qt
1 qt = 32 fl oz
1 cup = 8 fl oz
1 Tbs = 3 tsp
1 cup = 16 Tbs
1 gal = 128 fl oz
1 gal = 231 in^3

Dry Measure

1 qt = 2 pt
1 peck = 8 qt
1 bu = 4 pecks
1 bu $\approx$ 1.244 ft^3
1 bu $\approx$ 2150 in^3
1 yd^3 = 27 ft^3
1 ft^3 = 1728 in^3

UNIT ANALYSIS

Unit Analysis is a technique that can be used to change units of measure.

In using Unit Analysis, we multiply by unit fractions, and cancel undesired units.

****

UNIT ANALYSIS WORKS BECAUSE:

1. *Any value divided by its equivalent represents a value of 1, called a unit fraction.*

   Examples: $\frac{3}{3}$; $\frac{9}{4+5}$; $\frac{1\text{ ft}}{12\text{ in}}$; $\frac{5280\text{ ft}}{1\text{ mi}}$

2. *Multiplying by a unit fraction (value of 1) does not change the size of the represented measurement.*

   $912\text{ in}\cdot\frac{1\text{ ft}}{12\text{ in}} \approx 912\text{ in};$ $\quad 3.2\text{ mi}\cdot\frac{5280\text{ ft}}{1\text{ mi}} \approx 3.2\text{ mi}$

3. *Units of measure can be "cancelled" in fraction multiplication just as common numerical factors.*

   $\frac{\cancel{7}}{\cancel{8}}\cdot\frac{3}{\cancel{7}}\cdot\frac{\cancel{8}}{11}$ $\quad \frac{17\ \cancel{\text{in}}}{\cancel{\text{min}}}\cdot\frac{1\ \cancel{\text{min}}}{60\text{ sec}}\cdot\frac{1\text{ ft}}{12\ \cancel{\text{in}}}$

so $\frac{912\ \cancel{\text{in}}}{1}\cdot\frac{1\text{ ft}}{12\ \cancel{\text{in}}} = 152\text{ ft}$ $\quad \frac{3.2\ \cancel{\text{mi}}}{1}\cdot\frac{5280\text{ ft}}{1\ \cancel{\text{mi}}} = 16{,}896\text{ ft}$

****

In doing a problem using the Unit Analysis technique, follow the three steps outlined below:

1. ***Indicate the units that you wish to have (called the unknown), and the starting units (called the subject).***

   SUBJECT ⟶ ***UNKNOWN***

2. ***List the needed equivalences.***

3. ***Starting with the subject, multiply by unit fractions derived from step 2 to cancel unwanted units.***

Many of you are probably aware that Unit Analysis is a good technique to use when converting units, but we have found the procedure to be effective for solving a wide variety of problems, including direct proportion problems and basic percent problems. The following examples illustrate the potential of this procedure.

****

EXAMPLE 1: If raspberries weigh 24.0 oz per quart and the normal yield is $10\bar{0}0$ qt per acre, about how many pounds of raspberries can we expect from a 3.37 acre field?

1. $3.37\ \text{acres} \longrightarrow \text{lb of raspberries}$

2. $24.0\ \text{oz} \approx 1\ \text{qt}$
   $10\bar{0}0\ \text{qt} \approx 1\ \text{acre}$
   $16\ \text{oz} = 1\ \text{lb}$

3. $$\frac{3.37\ \cancel{\text{acres}}}{1} \times \frac{10\bar{0}0\ \cancel{\text{qt}}}{1\ \cancel{\text{acre}}} \times \frac{24.0\ \cancel{\text{oz}}}{1\ \cancel{\text{qt}}} \times \frac{1\ \text{lb}}{16\ \cancel{\text{oz}}} \approx 5060\ \text{lb}$$

****

EXAMPLE 2: How many feet per second is a car traveling if its speed is 55 miles per hour?

1. $$\frac{55\ \text{mi}}{\text{hr}} \longrightarrow \frac{\text{ft}}{\text{sec}}$$

2. $1\ \text{mi} = 5280\ \text{ft}$
   $1\ \text{hr} = 60\ \text{min}$
   $1\ \text{min} = 60\ \text{sec}$

3. $$\frac{55\ \cancel{\text{mi}}}{\cancel{\text{hr}}} \times \frac{5280\ \text{ft}}{1\ \cancel{\text{mi}}} \times \frac{1\ \cancel{\text{hr}}}{60\ \cancel{\text{min}}} \times \frac{1\ \cancel{\text{min}}}{60\ \text{sec}} \approx 81\ \text{ft/sec}$$

****

EXAMPLE 3: The manual for a vacuum pump indicates that the correct vacuum should be 5.0 lb/sq in. What would the correct reading be on a gauge that measures in g/sq cm?

1. $$\frac{5.0\ \text{lb}}{\text{in}^2} \longrightarrow \frac{\text{g}}{\text{cm}^2}$$

2. $1\ \text{lb} \approx 454\ \text{g}$
   $(1\ \text{in})^2 = (2.54\ \text{cm})^2 \qquad 1\ \text{in}^2 \approx 6.45\ \text{cm}^2$

3. $$\frac{5.0\ \cancel{\text{lb}}}{\cancel{\text{in}^2}} \times \frac{454\ \text{g}}{1\ \cancel{\text{lb}}} \times \frac{1\ \cancel{\text{in}^2}}{6.45\ \text{cm}^2} \approx 350\ \text{g/cm}^2$$

PRACTICE PROBLEMS

1. Change 7.500 inches into centimeters.

2. Change 6.2 lb/in^2 into newtons per square centimeter (N/cm^2).

3. A tractor travels 95 ft in 15 sec. How many miles per hour does it traveling?

4. Given $F = \frac{mv^2}{r}$, where m = 12.4 kg, v = 13.5 m/sec and r = 27.4 m, find F.

5. Given $h = \frac{V}{\pi r^2}$ where $V = 1950\ m^3$, $\pi = 3.14$ and r = 12.6 m, find h.

6. Given $L = \frac{RA}{P}$, where $R = 3.25\ \Omega$, $P = 1.72 \times 10^{-6}\ \Omega \cdot cm$ and $A = .0250\ cm^2$, find L.

ANSWERS (to three significant digits)

1) 19.05 centimeters

2) 4.28 N/cm^2

3) 4.3 mi/hr

4) $F = 82.5\ kg \cdot m/sec^2$

5) h = [redacted] m 3.91

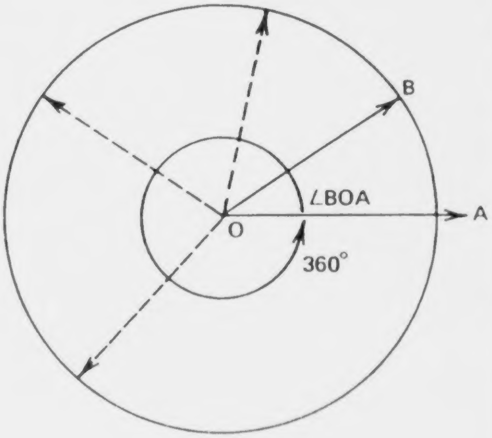
6) L = 47,200 cm

UNDERSTANDING ANGLES

REMEMBER THIS–

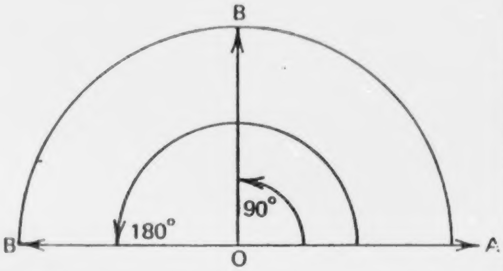
1. In the drawing, $\overline{OB}$ is a line that turns, or pivots, around O. Wherever it stops, it makes an *angle* with the line $\overline{OA}$. The angle is called angle BOA, or ∠BOA.

2. If $\overline{OB}$ goes all the way around and comes back to its starting place, it makes a full circle around O. A full circle is 360 degrees, or 360°.



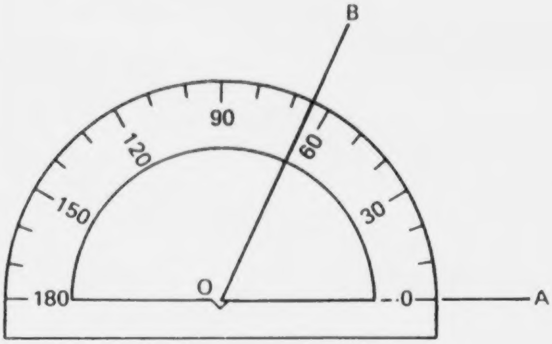
3. If $\overline{OB}$ goes $\frac{1}{4}$ of the way around the circle, it makes an angle of 90° with $\overline{OA}$, because $\frac{1}{4}$ of 360° is 90°. An angle of 90° is called a *right angle*.

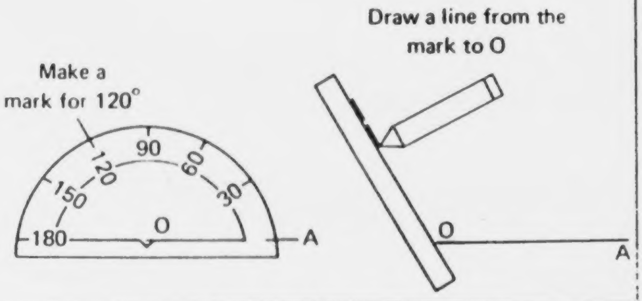
4. If $\overline{OB}$ goes $\frac{1}{2}$ of the way around the circle, it makes an angle of 180° with $\overline{OA}$. An angle of 180° is a straight line. It is called a *straight angle*.



5. The drawing shows how to measure an angle with a *protractor*. The measure of ∠BOA is 65°.

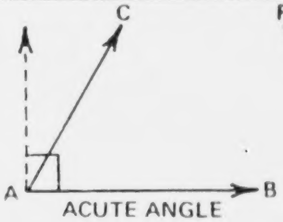
6. A protractor can be used to draw an angle of any measure. The drawing shows how to draw an angle of 120°.


B
90
120
60
150
30
180
O
0
A

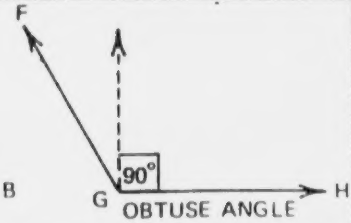

Make a mark for 120°
Draw a line from the mark to O
90
120
60
150
30
180
O
A
O
A

7. An angle that is less than 90° is called an *acute angle*. Angle CAB is an acute angle.

8. An angle that is more than 90° is called an *obtuse angle*. Angle FGH is an obtuse angle.



ACUTE ANGLE



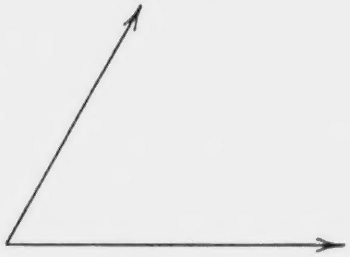
OBTUSE ANGLE

Name ______________________________ Class __________ Date ______________

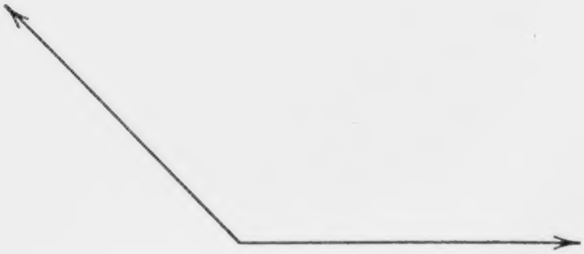
EXERCISE

1 USING WHAT YOU LEARNED ABOUT ANGLES

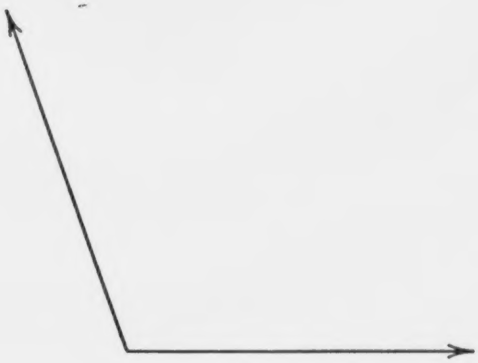
1. Using a protractor, measure each of these angles.



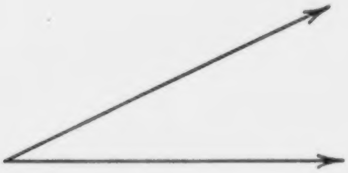
(A) ____



(B) ____



(C) ____

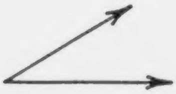


(D) ____

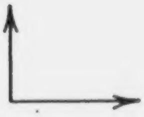
2. Using a protractor, draw the following angles.

(A) 15° (B) 60° (C) 90° (D) 115°

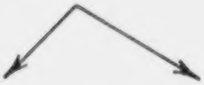
3. Tell whether each of these angles is an acute angle, a right angle, or an obtuse angle.



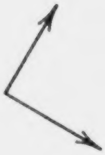
(A) ______________



(B) ______________



(C) ______________



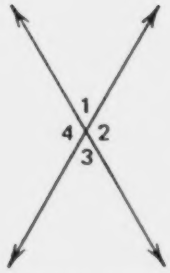
(D) ______________

ANGLE RELATIONSHIPS

REMEMBER THIS–

1. When two lines cross, they make four angles. Each pair of opposite angles are called *vertical angles.* Vertical angles are equal. In the drawing,

$\angle 1 = \angle 3$ $\angle 2 = \angle 4$

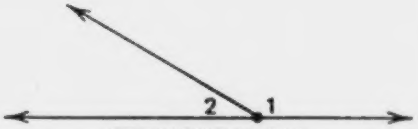


VERTICAL ANGLES

2. If two angles together make a straight angle, they are called *supplementary angles.* Each angle is the *supplement* of the other angle. The sum of two supplementary angles is 180°. In the drawing,

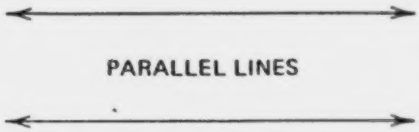
$\angle 1 + \angle 2 = 180°$

$\angle 2$ is the supplement of $\angle 1$
$\angle 1$ is the supplement of $\angle 2$



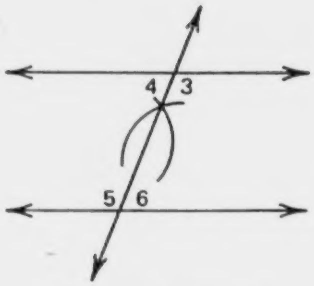
STRAIGHT ANGLE

3. Parallel lines are lines that never cross. They stay the same distance apart. If another line crosses two parallel lines, it makes eight angles. Many of these angles are equal.



Alternate interior angles are equal. In the drawing,

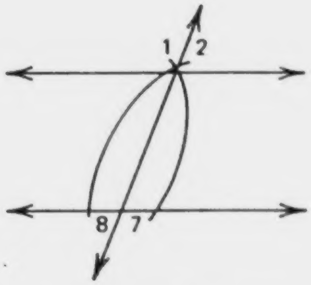
$\angle 4 = \angle 6$ $\angle 3 = \angle 5$



ALTERNATE INTERIOR ANGLES

Alternate exterior angles are equal. In the drawing,

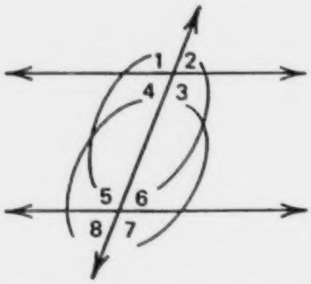
$\angle 1 = \angle 7$ $\angle 2 = \angle 8$



ALTERNATE EXTERIOR ANGLES

Corresponding angles are equal. In the drawing,

$\angle 1 = \angle 5$ $\angle 2 = \angle 6$
$\angle 4 = \angle 8$ $\angle 3 = \angle 7$



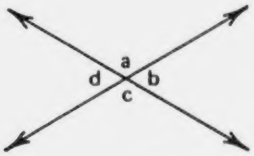
CORRESPONDING ANGLES

Name ______________________________ Class ____________ Date ______________

EXERCISE

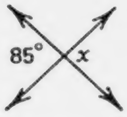
2 FINDING ANGLES

1. Name two pairs of vertical angles.

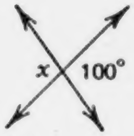


(A) ________ (B) ________

2. In each case find the measure of the angle marked x.

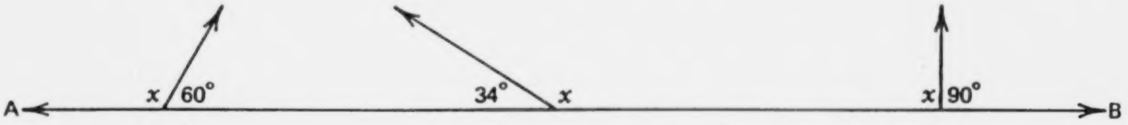


x = ________



x = ________

3. $\overline{AB}$ is a straight line. In each case find the measure of the angle marked x.



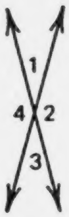
x = ______ x = ______ x = ______

4. Name the supplement of each angle.

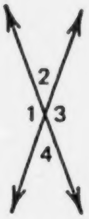
(A) 80° ______ (B) 90° ______ (C) 45° ______ (D) 135° ______ (E) 179° ______

5. Find the measure of all the angles. Remember to use supplementary angles.

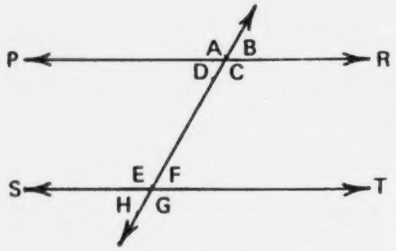
$\angle 1 = 30^\circ$
$\angle 2$ = ______
$\angle 3$ = ______
$\angle 4$ = ______



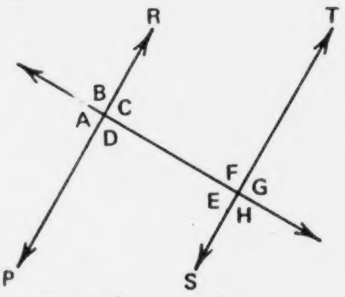
$\angle 1 = 140^\circ$
$\angle 2$ = ______
$\angle 3$ = ______
$\angle 4$ = ______



6. $\overline{PR}$ and $\overline{ST}$ are parallel lines. Find the measure of all the angles.

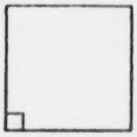


$\angle C = 120^\circ$ $\angle E$ = ______
$\angle A$ = ______ $\angle F$ = ______
$\angle B$ = ______ $\angle G$ = ______
$\angle D$ = ______ $\angle H$ = ______



$\angle B = 80^\circ$ $\angle E$ = ______
$\angle A$ = ______ $\angle F$ = ______
$\angle C$ = ______ $\angle G$ = ______
$\angle D$ = ______ $\angle H$ = ______

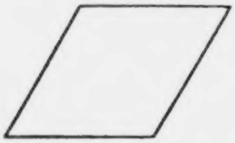
2-D GEOMETRIC SHAPES


SQUARE

$A = b \cdot h$
$= \text{base} \cdot \text{height}$

RECTANGLE

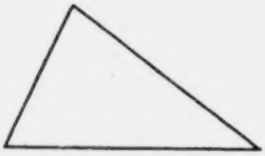
$A = b \cdot h$

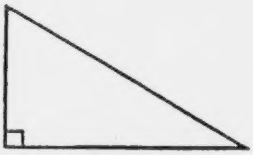

RHOMBUS

$A = b \cdot h$

PARALLELOGRAM

$A = b \cdot h$

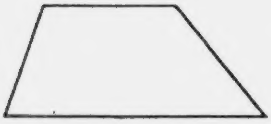

TRIANGLE


RIGHT
TRIANGLE

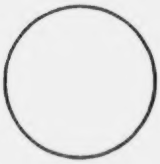
$A = ½ \cdot b \cdot h$, or

$A = \sqrt{s(s-a)(s-b)(s-c)}$

where $s = ½ \cdot P$


TRAPEZOID

$A = b_{ave} \cdot h$

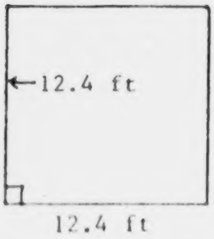

CIRCLE

$A = \pi \cdot r^2$ ($\pi = 3.1416$)

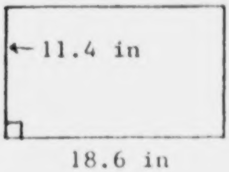
$C = \pi \cdot d$

FOR PRACTICE, FIND THE AREA OF EACH OF THE FOLLOWING:

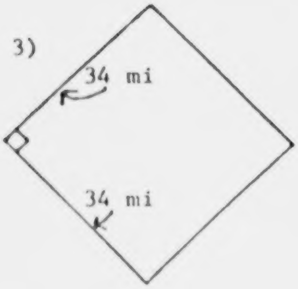
1)


12.4 ft
12.4 ft

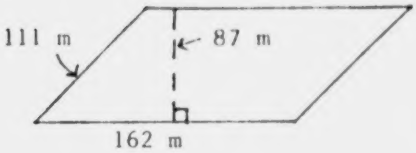
2)


11.4 in
18.6 in

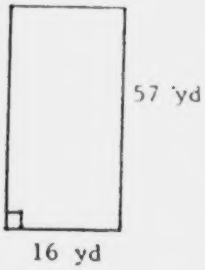
3)



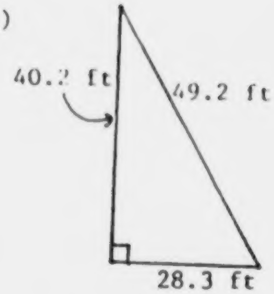
4)


111 m
87 m
162 m

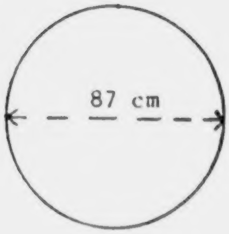
5)



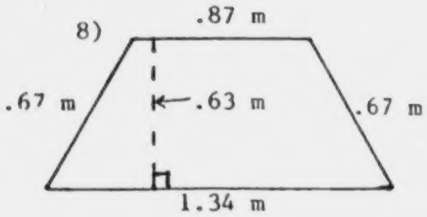
6)


40.2 ft
49.2 ft
28.3 ft

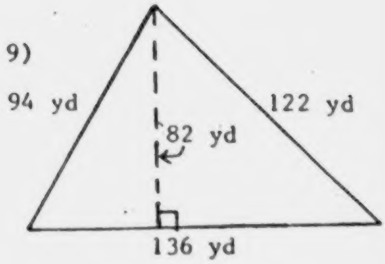
7)



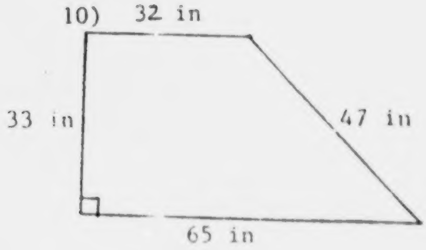
8)


.87 m
.67 m
.63 m
.67 m
1.34 m

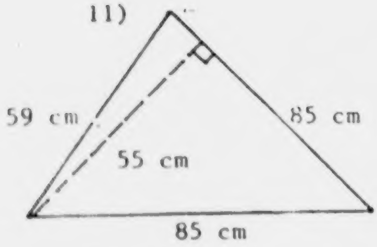
9)


94 yd
122 yd
82 yd
136 yd

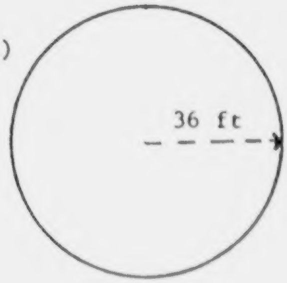
10)


32 in
33 in
47 in
65 in

11)


59 cm
85 cm
55 cm
85 cm

12)



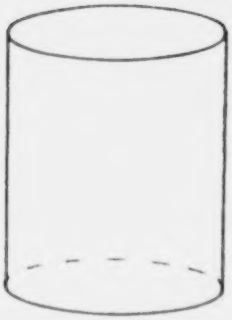
ANSWERS (to three significant digits)

1) 154 ft^2 2) 212 in^2 3) 1160 mi^2 4) 14,100 m^2

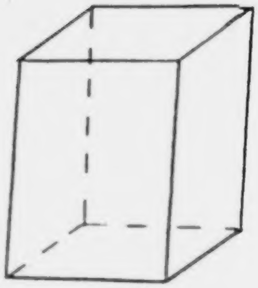
5) 912 yd^2 6) 569 ft^2 7) 5940 cm^2 8) 0.696 m^2

9) 5580 yd^2 10) 1600 in^2 11) 2340 cm^2 12) 4070 ft^2

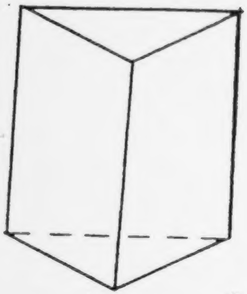
3-D GEOMETRIC SHAPES



CYLINDER

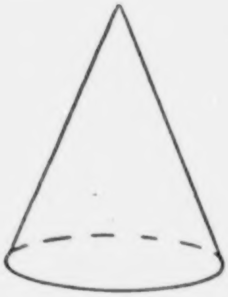


RECTANGULAR PRISM

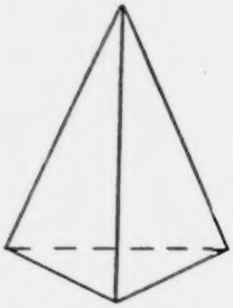


TRIANGULAR PRISM

$V = A_{base} \cdot H$

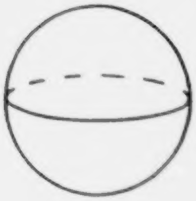


CONE



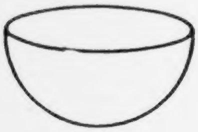
TRIANGULAR PYRAMID

$V = \frac{1}{3} \cdot A_{base} \cdot H$



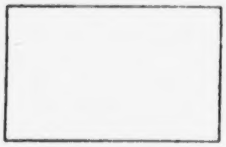
SPHERE

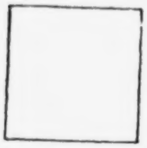
$V = \frac{4}{3} \cdot \pi \cdot r^3$



HEMISPHERE

SOME BASIC GEOMETRIC FIGURES


RECTANGLE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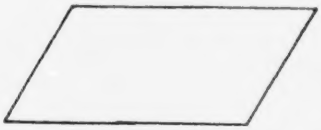
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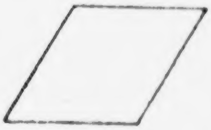
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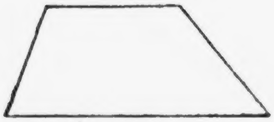
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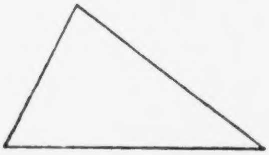
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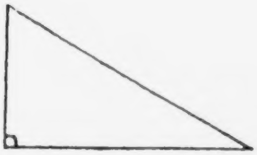
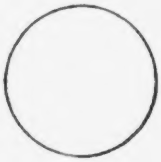

RIGHT TRIANGLE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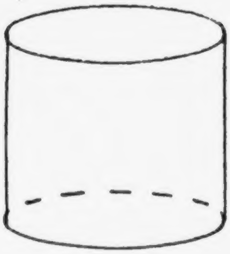
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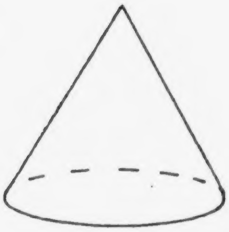
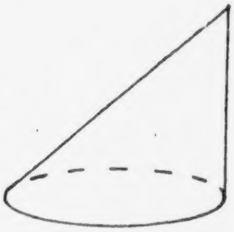
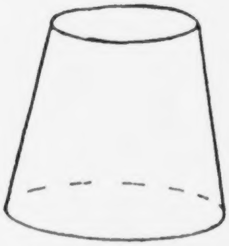
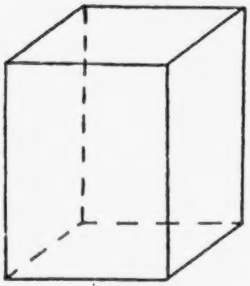
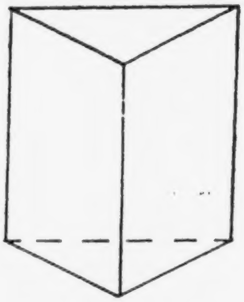

CONE
(RIGHT)


CONE
(OBLIQUE)


FRUSTUM OF
A CONE


RECTANGULAR
PRISM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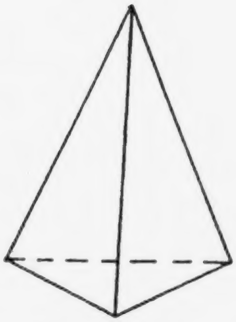
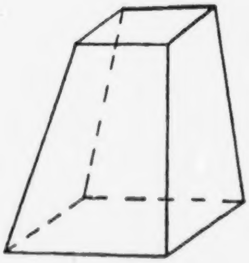
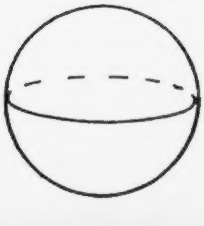
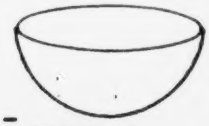
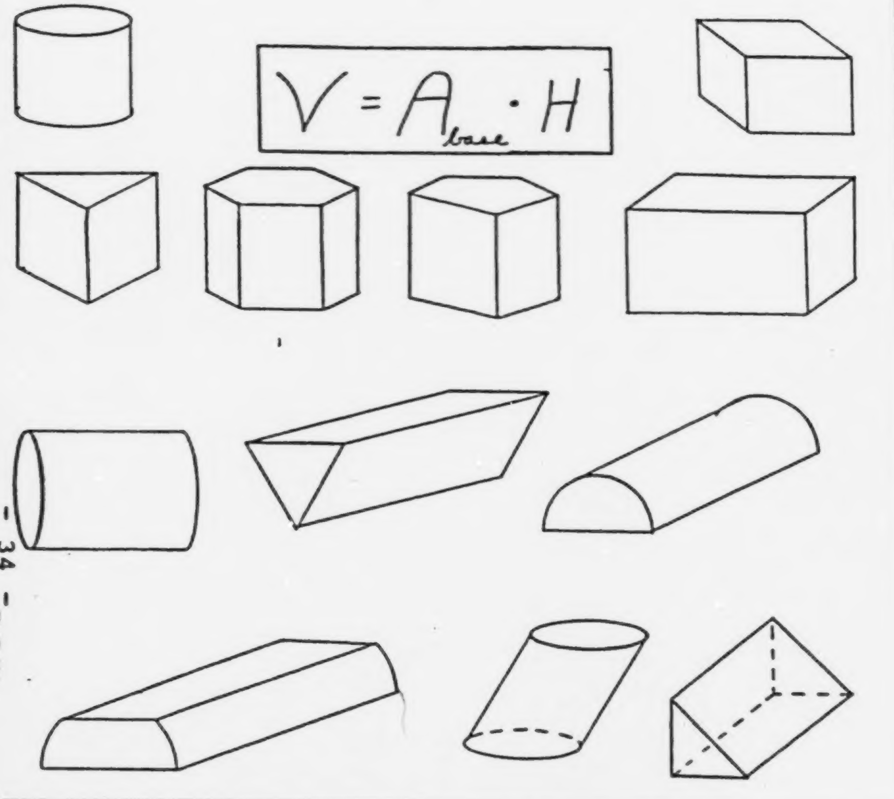
PRISM


TRIANGULAR
PYRAMID

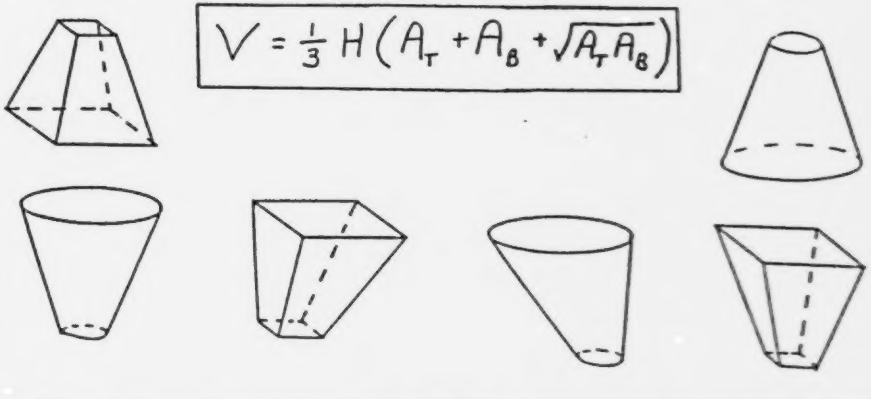

FRUSTUM OF
A PRISM


SPHERE

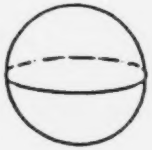

HEMISPHERE



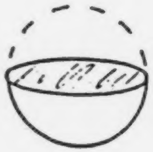
$$V = A_{base} \cdot H$$



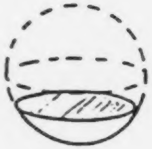
$$V = \frac{1}{3} H\left(A_T + A_B + \sqrt{A_T A_B}\right)$$



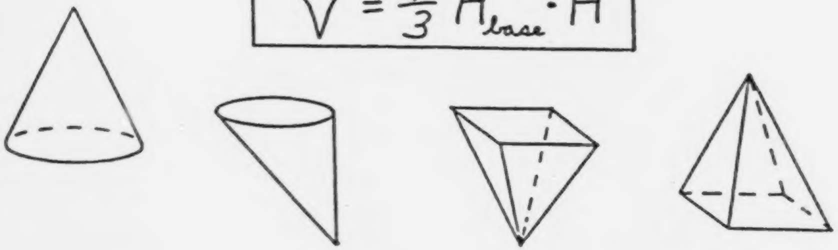
$$V = \frac{4}{3} \pi r^3$$



$$V = \left(\frac{4}{3} \pi r^3\right) \div 2 = \frac{2}{3} \pi r^3$$



$$V = \frac{1}{3} \pi h^2 (3r - h)$$

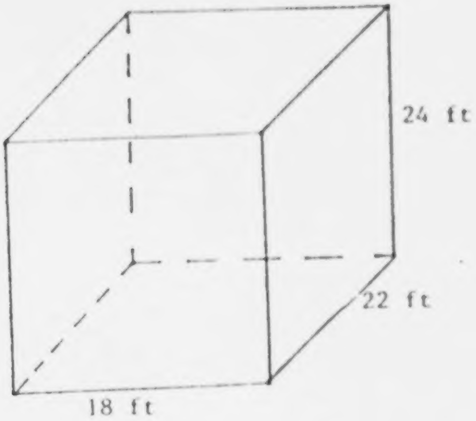


$$V = \frac{1}{3} A_{base} \cdot H$$

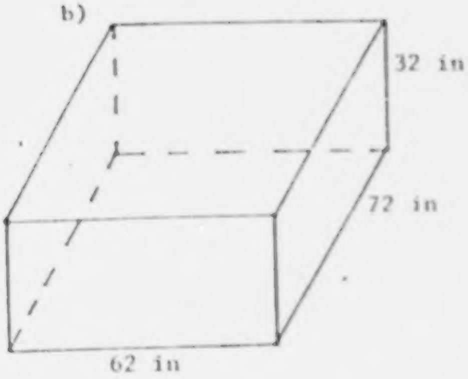
BEST COPY AVAILABLE

FOR PRACTICE, FIND THE VOLUME OF EACH OF THE FOLLOWING:

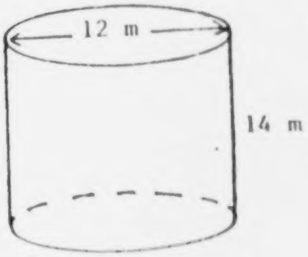
a)


24 ft
22 ft
18 ft

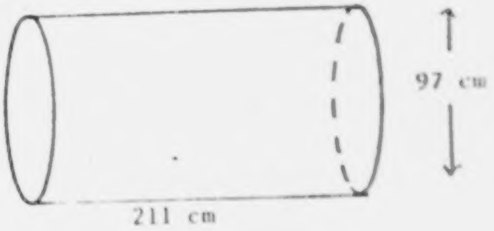
b)


32 in
72 in
62 in

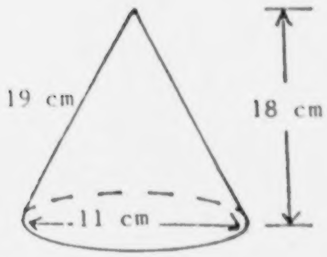
c)



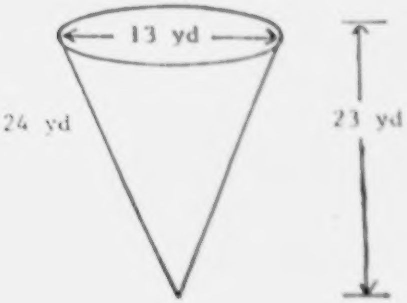
d)



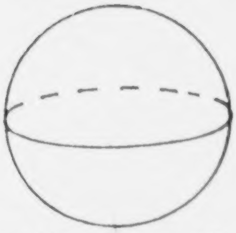
e)


19 cm
18 cm
11 cm

f)

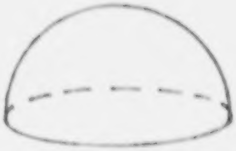

13 yd
24 yd
23 yd

g)



diameter = 17.4 cm

h)



radius = 12.3 yd

ANSWERS (to three significant digits)

a) 9500 ft^3 b) 143,000 in^3 c) 1580 m^3 d) 1,560,000 cm^3

e) 570 cm^3 f) 1020 yd^3 g) 2760 cm^3 h) 3900 yd^3

STATISTICS

Statistics is the science dealing with the:

1. **collection,**
2. **organization,**
3. **analysis, and**
4. **interpretation of numerical data.**

Collection of data is the process of obtaining measurements or counts.

Organization of data is the task of presenting the collected measurements or counts in a form suitable for deriving logical conclusions.

Analysis of data is the process of extracting relevant information from these measurements or counts, from which a summary can be formulated.

Interpretation of data is the task of drawing conclusions from the analysis of the data. *Usually this involves the formulation of predictions concerning a large collection of objects from information available for a small collection of similar objects - that is, **a sample**.*

An alternate definition of statistics is:

> **Statistics is a science that deals with problems capable of being answered by numerical information.**

In approaching the study of statistics, it is important to realize that no statistical procedure can, in itself, insure against mistakes, inaccuracies, faulty reasoning, or incorrect conclusions. The original data must be accurate, the methods must be properly applied, and the results must be interpreted properly.

Clear and forceful presentation is an important aid to the understanding and correct interpretation of data.

One method involves a summarized presentation of the numbers themselves, usually in tabular form - that is, **a table**.

The other consists in presenting the quantitative data in pictorial form - that is, **a graph**. A graph is a pictorial representation made for the purpose of studying changes in a single variable (i.e. a measurable characteristic) or comparing several similar or related variables. *To be effective, a graph should be simple and should emphasize the significant aspects of the data.*

In order to reduce a mass of data to an understandable form, we can construct a frequency table, or draw an appropriate graph representing the data.

It is useful to simplify the presentation even further by using certain measures that describe important features of the distribution.

DEFINITION: Any measure indicating a center of the distribution is called a **measure of central tendency**, or an average.

There are many measures of central tendency. We will work on finding values to represent the following:

The **arithmetic mean** of a set of data, denoted **m**, or $\bar{\mathbf{x}}$, can be found by dividing the sum of all data values by the number of such values. That is

$$\bar{x} = \frac{\Sigma x_i}{n}$$

The **median** of a set of data arranged in order of magnitude is the middle value, or the mean of the two middle values.

The **mode** of a set of data is that value which occurs with the greatest frequency. The mode may not exist, or there may be more than one mode.

A **weighted mean** is an average found by giving a higher "weight" to more important, or more relevant values, and a lower "weight" to the lesser values.

Relative merits of the mean, median and mode

The **mean** is the most commonly used of these measures of central tendency. It is easy to compute, takes all values into consideration, and is well designed for algebraic manipulation. Also, given the means of two or more groups, an overall mean can be calculated. *Reliability in sampling is the chief merit of the mean.*

One potential advantage of the **median** is that it is not influenced by extreme values - this is especially important in economic statistics. The median can still be calculated when the magnitude of extreme values is not given, but when their number is known.

The **mode** is the least important and the least used of these three measures because of its ambiguity. Its merits include that it is easily understood, and that it is not influenced by extreme values.

So far, we have examined several measures of the center of a distribution. It is also important to know the extent to which the data vary from this central point.

DEFINITION: A numerical value indicating the amount of scatter about a central point is called a **measure of dispersion**.

We will examine three measures of dispersion: the range, the average deviation, and the standard deviation.

The **range** of a set of data is the difference between the largest and the smallest values.

For a set of values whose mean is m, the **average deviation** is

$$A_d = \frac{\sum |x_i - m|}{n}$$

For a set of numbers whose mean is m, the **standard deviation**, denoted σ, is

$$\sigma = \sqrt{\frac{\sum (x_i - m)^2}{n}}$$

The square of the standard deviation (that is, the value prior to taking the square root in the above formula) is called the **variance** of the distribution.

Relative merits of the measures of dispersion

The **range** is the easiest of these measures to understand, but it depends solely on extreme values, which may be coincidental, and tells nothing of the distribution, or concentration about the center.

The **average deviation** is easy to understand, and uses all data points, giving due weight to extreme values. However, it is unsuitable for algebraic manipulation since the sign of some differences must be adjusted while calculating. Also, when the mean deviation for two sets of data is known, the mean deviation for the combined set cannot be calculated.

The **standard deviation** is the most widely used measure of dispersion in dealing with statistics. It is particularly suitable for machine calculations. Although not as understandable as the average deviation, it has all of its other advantages, plus it is suitable for algebraic work.

Consider the following quiz scores:

5 8 6 4 2 4 10 8 8 5

For the above scores, determine the mean, median, mode, range, average deviation, standard deviation, and variance.

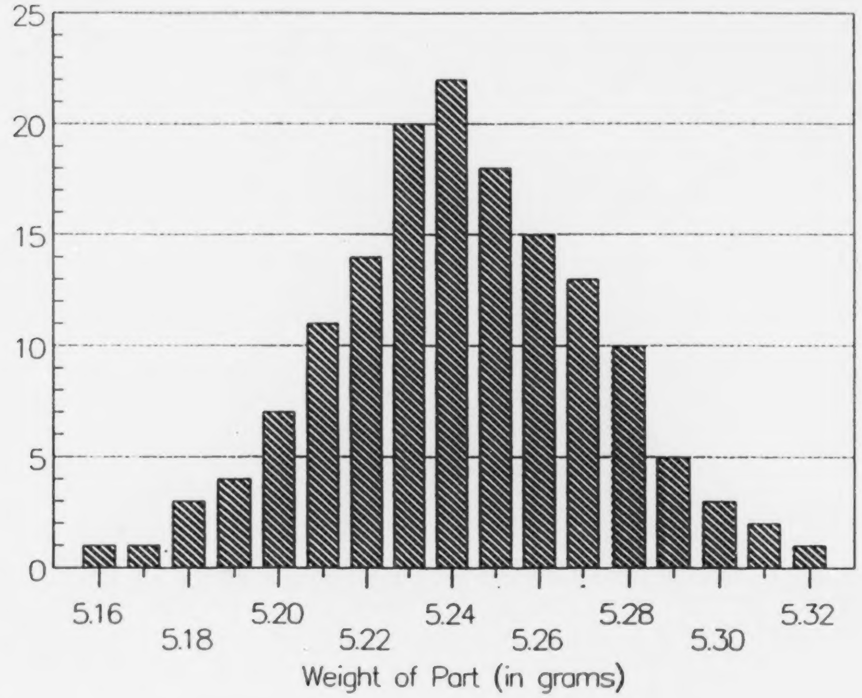
Consider the following weights of 150 parts number D123456.

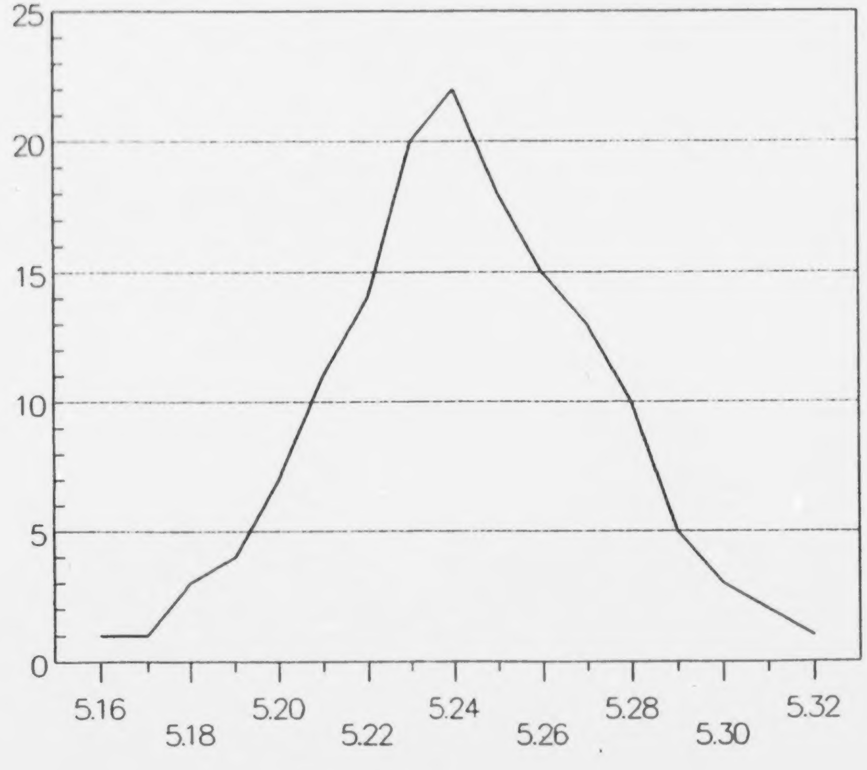
5.24 g	5.16 g	5.23 g	5.29 g	5.25 g	5.23 g	5.20 g	5.26 g	5.19 g	5.23 g
5.20 g	5.24 g	5.26 g	5.27 g	5.23 g	5.25 g	5.23 g	5.25 g	5.28 g	5.24 g
5.18 g	5.21 g	5.25 g	5.24 g	5.21 g	5.24 g	5.31 g	5.27 g	5.29 g	5.26 g
5.22 g	5.25 g	5.21 g	5.26 g	5.25 g	5.18 g	5.26 g	5.27 g	5.24 g	5.25 g
5.27 g	5.26 g	5.26 g	5.22 g	5.27 g	5.22 g	5.19 g	5.23 g	5.28 g	5.23 g
5.24 g	5.21 g	5.22 g	5.21 g	5.23 g	5.26 g	5.28 g	5.25 g	5.23 g	5.29 g
5.31 g	5.25 g	5.27 g	5.28 g	5.20 g	5.24 g	5.22 g	5.26 g	5.20 g	5.24 g
5.23 g	5.27 g	5.23 g	5.23 g	5.30 g	5.25 g	5.26 g	5.25 g	5.27 g	5.21 g
5.25 g	5.24 g	5.19 g	5.22 g	5.27 g	5.17 g	5.24 g	5.24 g	5.22 g	5.28 g
5.27 g	5.25 g	5.32 g	5.24 g	5.29 g	5.23 g	5.27 g	5.20 g	5.28 g	5.24 g
5.24 g	5.22 g	5.20 g	5.28 g	5.28 g	5.26 g	5.23 g	5.30 g	5.22 g	5.25 g
5.19 g	5.22 g	5.21 g	5.23 g	5.24 g	5.27 g	5.28 g	5.23 g	5.23 g	5.27 g
5.23 g	5.26 g	5.24 g	5.25 g	5.28 g	5.25 g	5.18 g	5.26 g	5.26 g	5.23 g
5.21 g	5.24 g	5.26 g	5.24 g	5.21 g	5.25 g	5.22 g	5.25 g	5.24 g	5.20 g
5.22 g	5.21 g	5.23 g	5.30 g	5.24 g	5.22 g	5.29 g	5.24 g	5.21 g	5.22 g

FREQUENCY TABLE

PART NUMBER D123456	
WEIGHT OF PART	NUMBER
5.16 grams	1
5.17 grams	1
5.18 grams	3
5.19 grams	4
5.20 grams	7
5.21 grams	11
5.22 grams	14
5.23 grams	20
5.24 grams	22
5.25 grams	18
5.26 grams	15
5.27 grams	13
5.28 grams	10
5.29 grams	5
5.30 grams	3
5.31 grams	2
5.32 grams	1
TOTAL	150

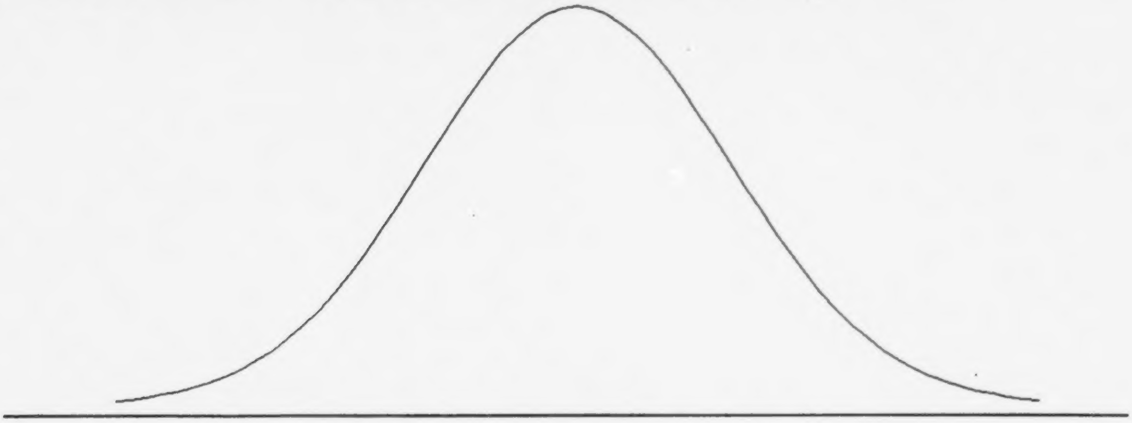
Histogram Showing Variation Among Parts #D123456





THE NORMAL FREQUENCY DISTRIBUTION CURVE

Recall that the Normal Curve, also called the bell curve or Gaussian curve, is the symmetrical curve pictured below.



The value represented by the highest point of the curve is the mean, median and the mode of the distribution of values represented by the curve.

The normal curve has been found to describe the frequency of occurrence of many factors with a high degree of accuracy:

- intelligence measures
- heights of a large group
- business data
- characteristics of manufactured products.
- achievement scores
- weights of a large group
- economic data

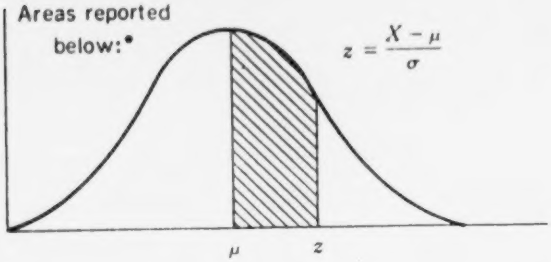
If we lay off a distance of one standard deviation on each side of the mean, we would enclose 68.26% of the area under the curve, and we can say that 68.26% of the items we are examining are within this area. Similarly, 95.44% of the items are within two standard deviations of the mean, and 99.72% of the items are within three standard deviations of the mean.

The attached table entitled "Standard Normal Distribution" can be used to determine the probability of occurrence of any value in the distribution.

EX 1: Consider IQ scores to follow a normal distribution with a mean of 100 and a standard deviation of 15. What percent of IQ scores will be higher than 140?

EX 2: Consider the amount of weight gained during a three week period by a group of animals on a certain ration. If this weight gain is normally distributed with a mean of 25 lb and a standard deviation of 3 lb, what percent of the animals would we expect to gain at least 20 lb during a three week period?

APPENDIX 2
AREAS UNDER THE STANDARD NORMAL PROBABILITY DISTRIBUTION



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	2.612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4014
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4983	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4989	.4989	.4989	.4989	.4990	.4990
3.5	.4997									
4.0	.4999683									

THE DISTRIBUTION OF SAMPLE MEANS
(THE DISTRIBUTION OF AVERAGES)

When working with items that follow a normal distribution with mean **m**, and standard deviation σ, we often take samples from the distribution and average them. The distribution of these averages would still be a normal curve, and it would still have the same mean, **m**, but the standard deviation of this new distribution would be much smaller than σ. This is demonstrated pictorially below.

$$z = \frac{\overline{X} - m_{\bar{x}}}{\sigma_{\bar{x}}}$$

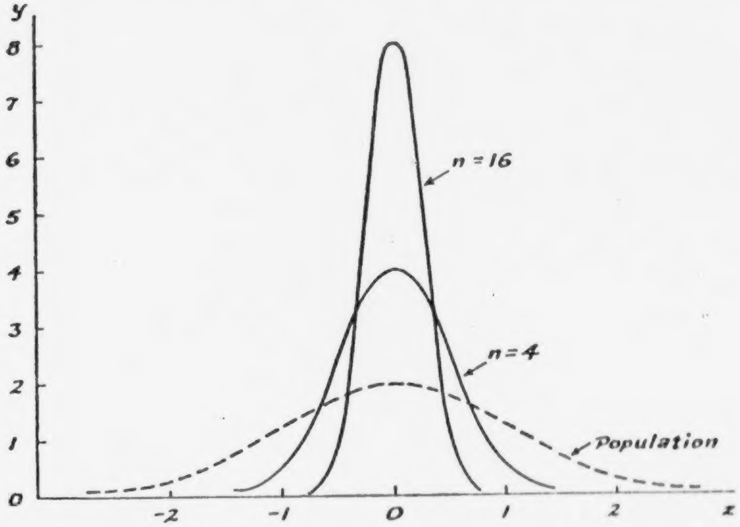


Fig. 8-2. Distribution of the means of samples of 4 and 16 variates from a normally distributed population.

EX 1: Suppose from a normal distribution of weights of part D222222 with mean 26.50 grams and standard deviation 2.40 grams we take a sample of 4 items. What is the probability that this average would be 27.28 grams or higher?

EX 2: If the OD of this part is normally distributed with m=1.500 in and σ=.024 in, what is the probability that the average OD of 9 peices would be 1.526 in or higher?

DIAMONITE 2000

MATH POSTTEST

The following problems represent a posttest to see what math skills you have learned in training. You may use a calculator.

Do the best that you can in answering the problems with the knowledge that you possess - do not get help from other people to do these problems. You may use the handouts distributed in class as a reference, but don't try to learn procedures that were not picked up during training.

Thank you for your cooperation.

Good luck!

1. The 1,980 ceramic parts #D25332 produced this morning represent a 12% decrease in production from yesterday. What was yesterday's production?

2. Of the 81 parts produced on third shift in E & S on 5/21/93, 6 were outside the tolerance range and had to be reworked. What percent of the parts needed to be reworked?

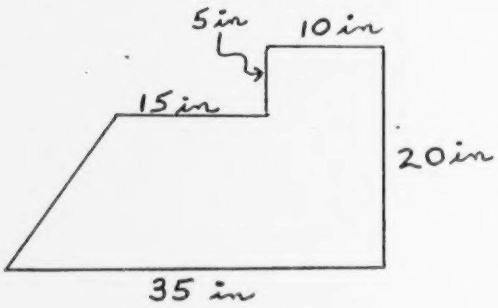
3. The allowable length (inches) of a part is marked as $5.300^{+2\%}_{-3\%}$ What are the **minimum and maximum** allowable lengths for this part?

4. It is reported that 360 parts (number D11836) were produced on third shift, and this represented 12.5% of the total parts of this type produced on 3/16/93. What was the total number of D11836 parts produced on this date?

5. The area of a rectangle measuring 3 ft by 5 inches is (show work)
    a. 15 ft^2
    b. 180 in
    c. 1.25 ft^2
    d. 20 ft^2

6. A certain cylinder has a height of 5.0 inches. The area of the circular base is 26 in^2. The Volume of this cylinder would be
    a. 130 in^3
    b. 5.2 in
    c. 5.2 liters
    d. 130 in^2

7. Find the area of the figure drawn at the right.



8. The metric prefixes meaning 1000, 1/100, and 1/1000 are
    a. mega, hecto, and centi
    b. kilo, hecto, and deka
    c. deci, centi, and milli
    d. kilo, centi, and milli

9. If 90 ft/min is changed to inches/sec, the result is (show work)
    a. 90 inches/sec
    b. 1.5 inches/sec
    c. 1080 inches/sec
    d. 18 inches/sec

10. Given $F = \frac{mv^2}{r}$, where m = 25 kg, r = 125 m, and v = 11 m/sec, find F. Be sure to label properly!

11. The median of the numbers 15, 20, 8, 7, and 10 is
    a. 10
    b. 8
    c. 12
    d. 15

12. Two measures of dispersion are
    a. the mean and the mode
    b. the range and the standard deviation
    c. the median and the range
    d. the mean and the mean deviation.

13. In a normal curve, about what percent of the values are within one standard deviation?
    a. 50%
    b. 68%
    c. 95%
    d. 99%

For questions 14 and 15:

If the distribution of individual weights for a part forms a normal curve with mean 20.0 g and standard deviation 5.00 g, the distribution of sample averages will also follow a normal curve.

14. If the size of each sample that is averaged is four (4) parts, what would be the mean of the distribution of averages?
    a. 20.0 g
    b. 5.0 g
    c. 10.0 g
    d. There is not enough information to determine this mean.

15. If the size of each sample that is averaged is four (4) parts, what would be the standard deviation of the distribution of averages?
    a. 5.00 g
    b. 1.25 g
    c. 2.50 g
    d. There is not enough information to determine this standard deviation.

DIAMONITE
2000

PROBLEM SOLVING
THROUGH TEAMS

THE OHIO STATE UNIVERSITY

Agricultural Technical Institute

GEORGE M. KREPS

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DIAMONITE 2000

COURSE TITLE: TEAM WORK SKILLS - PROBLEM SOLVING THROUGH TEAMS

COURSE DESCRIPTION: This course includes the theory and practice of solving problems through work teams. Specifically there will be training in building an effective team, use of problem solving tools in teams and actual use of team building techniques.

COURSE OBJECTIVES: The effectiveness of teams is fundamental to the implementation of increasing the problem solving activity of the company. Patricipants will be to:

- Define teamwork
- Identify and utilize successful team work techniques
- Identify and utilize problem solving techniques
- Diagnose teamwork problems and implement solutions
- Design and implement out team building activities

TEXT: Diamonite Notebook and The Memory Jogger, a Pocket Guide for Continuous Improvement

TIME REQUIEMENT: 18 Class Hours

LOCATION: Diamonite, Shreve, Ohio

INSTRUCTOR: George M. Kreps

ACKNOWLEDGEMENTS: This material has been developed by the author through teaching courses in team building, problem solving and total quality management at the Institute and various corporations. Portions of this material have been adapted from various sources. Every effort has been made to acknowledge each source.

SESSION I

Bankers can learn a lot from the teen-agers who work at McDonald's

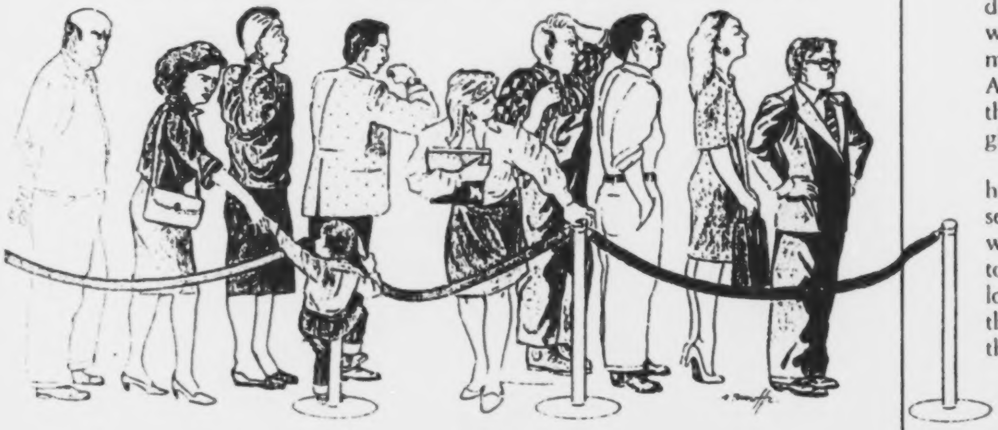
Serves Them Right

Condensed from Across the Board

Jack Falvey

In the area of New Hampshire where I live, there are two very similar buildings that I visit regularly. Both are free-standing, single-story structures with ample parking and drive-through facilities. Each has a canvas banner tied across the front. One says, "Try Our Chicken Fajitas"; the other, "Try Our ATM," or automated teller machine. In many ways they are in similar businesses. The wonder is that they take such different approaches to the same customers.

Dick Morrison, owner of the local McDonald's, discovered that more than 50 percent of his business came at his drive-through window. So he ripped out the side of his building and added a second window just for the cash part of the transaction. The existing window was used for order pickups. He then attached two-way radios to his employees so they could work as a team to better serve his driving customers. The object was to serve more customers faster, and thus build volume and profits.



At the other business, a local branch bank, a large number of customers used the drive-through window. It did double duty. Hooked up to the window was a vacuum-tube system that connected with another drive-through unit on a small island opposite. This way, two customers could be served at once. However, the bank figured that switching the island customers to an automated teller machine would cut costs and increase profits. So the vacuum-tube unit was torn out and replaced with an ATM. An hour was also cut off the drive-through window schedule.

Soon there were long lines at the drive-through window, and customers were complaining. Ever the salesman, the bank manager replied that ATMs are the next great wonder of the world, and that everyone should give the machine a try.

At McDonald's, Dick Morrison has an office in his building. He is seldom in it. He says his customers won't take the trouble to go back to see him, so he works outside a lot, cleaning up trash and pruning the roses. Everyone in town knows that the guy in the cardigan sweater and baseball cap is Dick and that he owns the place.

Inside McDonald's, even though there are many more cu[illegible]ers than in the bank, there are no red-rope mazes. No one says, "Who's next?" All you hear is, "Can I help you over here?" Behind the counter is a level of activity an army gun crew would admire. Sometimes three people will fill just one order. They look over one another's shoulders at the computer screens and run to get what is missing. All the managers help when things are busy. Often, during lunch hour, Morrison cooks the french fries to free one more counterperson and speed up his operation.

At the bank, the manager has an office on the corner of the building. It has two glass walls, so the drive-in line often wraps right around it. Everyone can see him in there, either on the phone or doing paper work. Since his back is to the windows, he never makes eye contact with those in line.

Sometimes people in line outside park their cars, hoping to get through quicker on the inside. But the teller line inside seldom seems to have more than two windows open. There may be three or four extra workers doing things in the back, but they are usually too busy to help the people standing in line. And to all those bank people sitting at their desks only ten feet away, the customers in line seem to be invisible.

Do people talk about the fast service at McDonald's? Usually not. They just go there. Do people talk about the slow service at the bank?

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ILLUSTRATION: ANDREA BARUFFI

SESSION 1

TOPIC A

- Description of team work
- Introduction to team building
- Introduction to problem solving tools

Seminar Presentations:

1. Get acquainted - autographs

2. Creative problem solving exercise

3. Five cases of problem solving in teams

Reading Assignment for Session 2:

1. Memory Jogger - pages 4-8 and 64-68

Preview Assignment for Session 2:

1. Read and answer questions - Zen Leadership: The Human Side of Total Quality Management

2. Write down and bring to class one suggestion to improve production in your work based on your viewing of the video by Peters - "Passion for the Customer"

All the time. And they do everything they can to keep from going there. They cash checks at the supermarket or the gas station. They send deposits by mail.

Knowing what customers need and want is basic to any business. The teen-agers at McDonald's have mastered this lesson. Many experienced bank managers have not. And they are paying the price. The folks in my town aren't surprised that McDonald's has been thriving, while the state's banks have not.

* * *

In Name Only

For most of our married life, my wife and I lived in small towns in northern Illinois. We rather enjoyed being the only "Good" family in town. Recently, we moved to El Paso, Texas, where we share our surname with several other families. I really shouldn't have been surprised to overhear my wife say on the phone one day, "Yes, I'm Good all right, but not that Good."

—Contributed by John Good

Growing up with the surname "Blowe" (pronounced "blow"), I had more than my share of smart remarks about my name. One memorable one came when my family changed doctors. The entire family had met the new doctor except me. When my mother brought me for a checkup, he commented, "So, this is the final Blowe."

—Contributed by Adrienne B. Shea

Stationed at Fort Bragg, N.C., I have become friends with the wife of the top-ranking dentist on the post. His name—Dr. Payne—has caused much amusement. Although he is now a colonel, his wife said he used to be a Major Payne.

—Contributed by Raye M. Cousins

It's All Downhill

For fathers the three most dangerous words in skiing are, "Follow me, Dad!"

—Contributed by Kenneth O. Gilmore

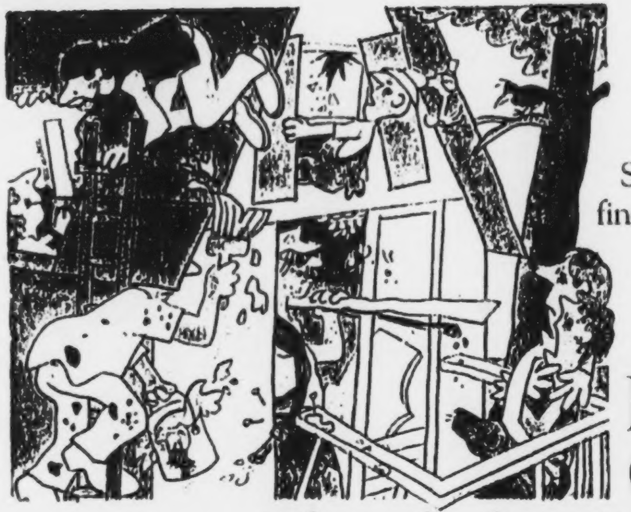
My friend, a psychiatrist, met another physician, an orthopedist, at a ski resort one winter. "I have an idea," my friend said. "Let's form a partnership: I'll deal with the skiers and their anxieties at the top of the hill, and you can take care of them at the bottom."

—Contributed by Lucille Doty

An eleven-year-old, new to skiing, found herself tumbling down the slopes more often than not. After one such minor disaster, an experienced skier engaged her in conversation. "What do you plan to be when you grow up?" he asked.

"An avalanche, I think," was the woeful reply.

—Contributed by Harry Allman



Seven tips for finding the best contractor

Don't Get Chiseled on Home Improvements

Condensed from
"How to Hire a Home Improvement Contractor Without Getting Chiseled"
Tom Philbin

A couple in San Jose, Calif., wanted additions on both ends of their home. The contractor persuaded them to pay his entire $125,000 fee up front. He opened the two ends of the house, then left—never to return.

A New York couple purchased kitchen cabinets for their vacation home for $1200 and hired a carpenter to install them at $50 an hour. This was high, they thought, but he was a "nice man" and promised the job would take only a day and a half. They didn't think they needed a contract for such a small project. Three and a half weeks later, when the contractor finished the job, he presented a bill for over $10,000.

Last year Americans spent about $100 billion to renovate, repair or alter their homes. Some were satisfied, but many were not. Complaints about home-improvement contractors consistently rank second or third at consumer-protection agencies. According to Susan Grant, former president of the National Association of Consumer Agency Administrators, the average grievance involves between $5000 and $10,000. When hiring a home-improvement contractor, you can reduce your chances of being vic-

"HOW TO HIRE A HOME IMPROVEMENT CONTRACTOR WITHOUT GETTING CHISELED," COPYRIGHT © 1991 BY TOM PHILBIN, IS PUBLISHED IN PAPERBACK AT $13.95 BY ST. MARTIN'S PRESS, 175 FIFTH AVE., NEW YORK, N.Y. 10010 ILLUSTRATION: ROY MCKIE

Total Quality Management

A NEW LOOK AT A BASIC ISSUE

By FRED G. STEINGRABER, *Chairman and CEO, A.T. Kearney, Inc.*

Delivered to the Institutional Investor CEO Roundtable, Naples, Florida, January 19, 1990

FEW issues have gained more attention in corporate boardrooms recently than competitiveness. And quality is one of the most critical ingredients of competitive success.

Today, quality management is a blue chip priority for corporate America and its leaders. Spurred by the realities of foreign competition, loss of marketshare, an increasingly critical buying public and the prominence given to the Malcolm Baldrige National Quality Award, top management in the United States is more than ever talking about and delivering quality.

The Baldrige award was created by the U.S. Department of Commerce in 1987 to encourage and recognize a commitment to quality by U.S. business. It was intended to be similar to Japan's coveted Deming Prize, named for W. Edwards Deming, the American engineer who helped Japan rebuild its industrial productivity and quality in the 1950s. So far, one service company, two small businesses and six manufacturing companies have received Baldrige awards.

A.T. Kearney's competitiveness research, conducted in 1987-88, demonstrated just how intensely chief executives were focusing on quality. This research asked U.S. manufacturing CEOs to review and evaluate their efforts and results to improve their competitiveness during the period 1982 to 1992. The bottom line of that research was that, in many industries, U.S. companies recognized that they had lost the dominant competitive position they held in the '50s and '60s and that they did not expect to regain it by 1992.

Our research looked at almost 50 determinants of competitiveness. Quality was far and away the factor CEOs cited most frequently as critical. Ninety percent of respondents named finished product quality and focus on quality processes by the total organization (total quality management) as the two most important determinants of competitiveness.

Our research demonstrated again that competitiveness has many dimensions. However, quality was the dimension that dominated the 1980s. If the '50s was the production decade, the '60s the marketing decade, the '70s the decade of strategic planning, then the '80s was the decade when quality finallly became an integral part of the American business culture.

The U.S. corporate perspective on quality underwent a dramatic change during that decade. At the beginning of the decade, U.S. business was generally indifferent toward quality, although some executives saw it as a basis for differentiation. Today quality is recognized as a prerequisite for survival.

Even greater efforts toward total quality are planned for the '90s. There is extensive evidence in our research that comprehensive and persistent attention is being given to quality in all areas of business. Today, the focus on quality has gone well beyond the finished product to looking at the processes throughout the total organization. In our research, CEOs said they were working on quality-related activities in several dimensions of competitiveness, including linking performance evaluation to quality.

We have learned the hard way that the cost of poor quality is extremely high. We have learned that in manufacturing it is 25-30 percent of sales dollars and as much as 40 percent in the worst companies. Moreover, the service industry is not immune, as poor quality can amount to an increase of 40 percent of operating costs.

However, there are many areas where we can see evidence of improving quality.

—Quality defects in newly manufactured U.S. cars have decreased dramatically. In 1981, more than 70 percent of new cars had defects within six months; that figure has dropped to well below 40 percent and continues to fall. It compares to slightly under 30 percent for Japanese vehicles.

—Companies like General Motors, which were recognized as laggards behind foreign competition in the early '80s, suddenly began to undertake initiatives and demonstrate in quality tests that they could rank very competitively. The Buick LeSabre has actually bested the Honda and Mercedes consistently in quality ratings and now Cadillac has won the Malcolm Baldrige National Quality Award.

—The introduction of the Baldrige Award is engendering a new commitment to quality at the highest levels of U.S. industry. The interest in the Baldrige award has increased dramatically since its inception, as the requests for applications demonstrate. In 1988, 12,000 companies requested applications; in 1989, 51,000 requests were received. And in 1990, the commerce department received 180,000 requests. The award mechanism itself is becoming a way to measure the growing commitment to quality.

There is a growing commitment to TQM or "total quality management," but more importantly an emerging realization of how big the quality hurdle really is. Consultants, trainers and inspectors are not the only ones focusing on quality. So are the leaders of industry — David Kearns at Xerox and Don Peterson at Ford, Bob Galvin at Motorola and Jim Binns at Timex. Business schools are reexamining their curricula to determine whether they have adequately provided for quality education in their program content.

Traditionally, we have thought of quality as meeting specifications, conforming to requirements and eliminating production variances. When we evaluated quality, we looked to the performance of the product or service and its ability to meet the customers' expectations. We assumed the quality was satisfactory if products were not being returned, if we did not receive complaints and if we improved the price/performance ratio for the customer. Today, evaluating quality is not just a question of meeting customers' expectations, but rather exceeding them.

Exceeding our clients' expectations is the theme of A.T. Kearney's own quality improvement program for the 1990s. A rigorous audit by our clients, which focuses significantly on quality, is an integral part of this effort. I mention my own firm as an example to emphasize that this effort must apply to every type of organization.

Service was once viewed as something distinct from quality. Now the two are intertwined in the emerging quality definition. Whereas quality addressed the price/performance ratio, service addressed many intangibles such as the responsiveness, dependability, commitment and caring demonstrated by employees in their dealings with customers. Frequently, service came to mean the promptness with which we responded to customer complaints and solve customer problems. Essentially, if quality meant the value customers derive from doing business with us, service meant the nature of the business relationship, how customers were treated during the total business transaction. Today, customers are evaluating the quality of this total business relationship as well as the value of the quality they derive from doing business with us.

Today we are coming to recognize that traditional quality or traditional service alone is not enough. The 1990s customer demands both. Today, customer value includes total quality and total service in both a value and relationship context.

The strategic implications of quality are expanding. They demonstrate the fallacies in the old truths about quality and lead us to develop new truths.

Quality missionaries such as Bob Galvin, former chairman of Motorola, take the view that quality does not cost anything. He says, "You can't raise cost by raising quality." On the contrary, you lower cost by raising quality.

Investment in quality can be an economic multiplier. Galvin believes our GNP could go up by ½ to 1 percent per year if we instituted a national policy on quality.

Furthermore, poor quality drives up operating costs. Increased warranty costs, scrap, rework, inspection and testing were estimated at as much as 25 percent of sales dollars for the average company in the late 1980s. In service industries, as much as 40 percent of costs is spent on fixing problems that shouldn't have happened.

Paying attention to quality in terms of value can yield:

– Lower operating costs
– Premium pricing, rather than competitive pricing
– Customer retention
– Enhanced reputation
– Access to global markets, rather than barriers
– Faster innovation
– Higher return on sales
– Higher return on investments

Total quality management is a customer-focused, strategy-driven approach that makes new and profound demands on every organization.

– Quality is a personal obligation of everyone, not just the responsibility of "that" department.

– Products and services must meet or exceed customer expectations.

– Companies must become best in class in products, services and processes.

– Quality demands a proactive culture within the organization that addresses quality on both the sourcing and delivery ends of the supply chain.

– Adversarial relationships are replaced by partnerships – with employees, suppliers and customers.

– The focus is on continuous improvement plus major step function improvements.

– Quality goes beyond the manufacturing floor and into all of the administrative, sales and distribution activities of most businesses. These areas represent even greater potential for improvement.

– Employees at all levels must be empowered to make decisions that allow them to provide superior quality and service.

– Quality is recognized as a journey rather than a destination. Its only goal is to exceed the customer's expectations.

We have come a long way in the last decade in our awareness about the need for quality. The leaders of corporate America have come a long way in their efforts and commitment to change the focus on quality. The level of activity seems to be growing exponentially – *and we are seeing results.*

We have passed through the phase when quality was a fad and into a period of real societal change.

We now look at quality well beyond the dimension of finished product and view total quality processes throughout the entire business operation.

We see quality not from the standpoint of taking time, but of saving time – not of costing money, but of saving money.

We have expanded our horizons to consider how improvements in quality relate to other improvements – such as faster cycle time in many operations.

Companies today are not only placing demands on their own organizations to become world class suppliers and world class customers themselves. They place equally heavy demands on their own suppliers to become world class.

ORGANIZATION
AND
DELEGATION

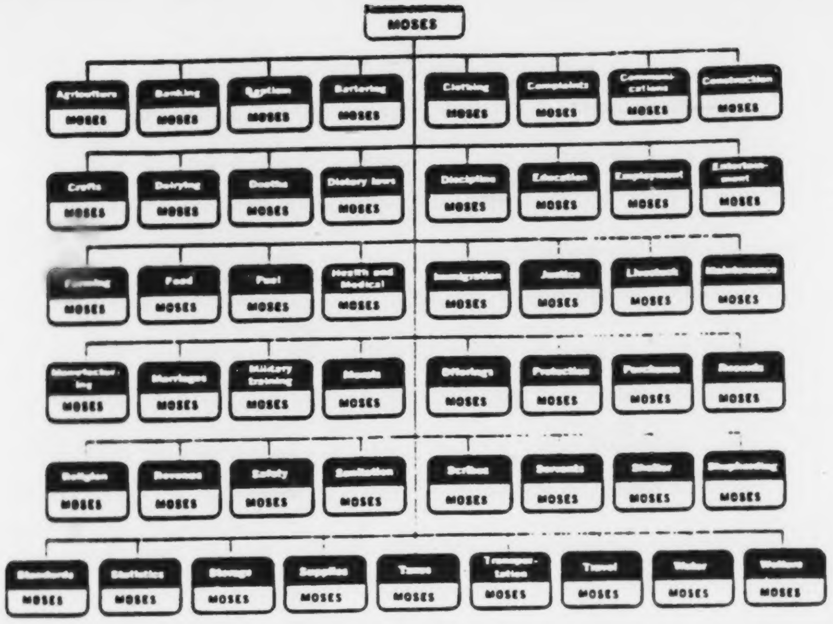
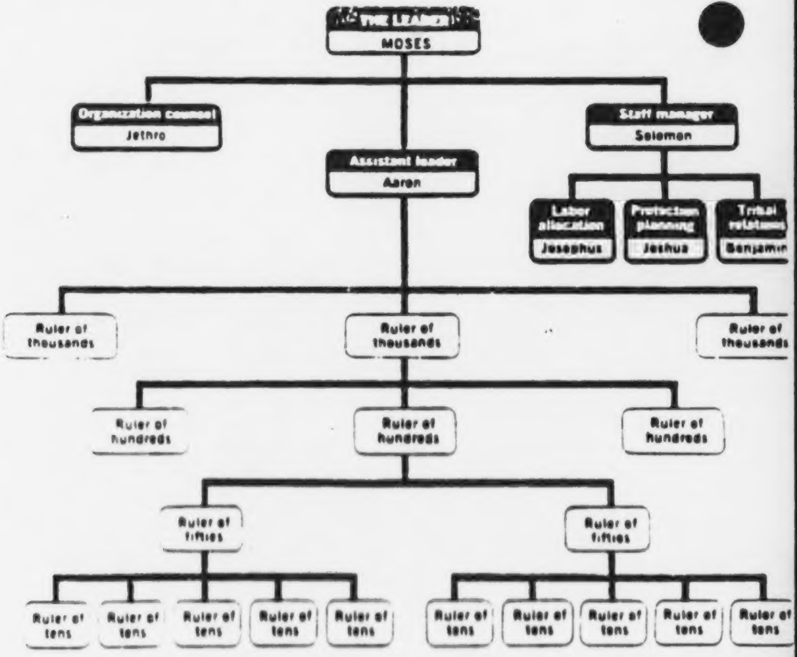

MOSES
Agriculture
Banking
Baptism
Bartering
Clothing
Complaints
Communications
Construction
Crafts
Dairying
Deaths
Dietary laws
Discipline
Education
Employment
Entertainment
Farming
Food
Fuel
Health and Medical
Immigration
Justice
Livestock
Maintenance
Manufacturing
Marriages
Military training
Morals
Offerings
Protection
Purchases
Records
Religion
Revenue
Safety
Sanitation
Scribes
Servants
Shelter
Shepherding
Standards
Statistics
Storage
Supplies
Taxes
Transportation
Travel
Water
Welfare

FIGURE 12 Disorganization. Perhaps the earliest recognition of the fact that the span of control can be too large is found in the Bible. In Exodus (Chapter 18), it is told, "Moses sat to judge the people and the people stood by Moses from the morning unto the evening." Moses' father-in-law, Jethro, saw this and told him "The thing thou doest is not good. Thou wilt surely wear away both thou and this people that is with thee: for the thing is too heavy for thee; thou art not able to perform it thyself alone."


THE LEADER
MOSES
Organization counsel
Jethro
Assistant leader
Aaron
Staff manager
Solomon
Labor allocation
Josephus
Protection planning
Joshua
Tribal relations
Benjamin
Ruler of thousands
Ruler of thousands
Ruler of thousands
Ruler of hundreds
Ruler of hundreds
Ruler of hundreds
Ruler of fifties
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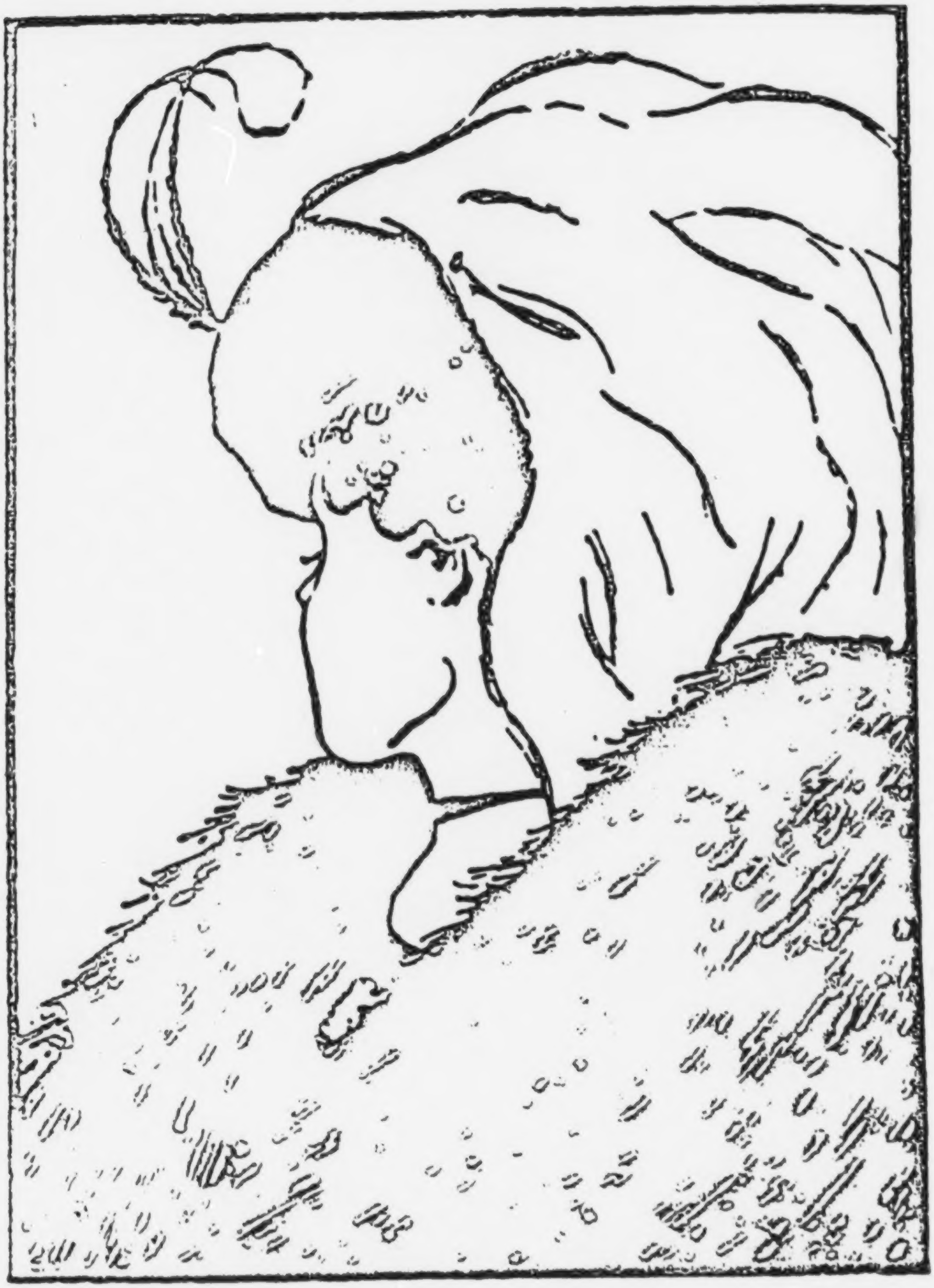
Ruler of tens

Dale, Ernest - Management Theory and Practice McGraw-Hil 1965

FIGURE 13 Organization. The subordinate rulers Jethro suggested could judge "every small matter" and bring the great matters to Moses. Up to this point, the Israelites had spent thirty-one years on a journey that had taken them only about halfway to the Promised Land. After the reorganization took place, the remaining half of the journey was completed in less than a year.

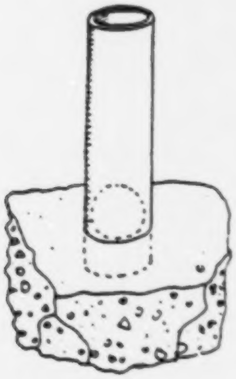


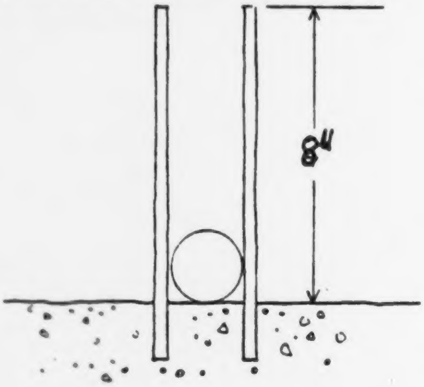
Creativity, Flexible Thinking & Cultural Blocks*

Group Exercise: Assume that a steel pipe is imbedded in the concrete floor of a bare room as shown below. The inside diameter is .06" larger than the diameter of a ping-pong ball (1.50") that is resting gently at the bottom of the pipe. You are one of a group of six people in the room, along with the following objects:

100' of clothesline
A carpenter's hammer
A chisel
A box of Wheaties
A file
A wire coat hanger
A monkey wrench
A light bulb

List as many ways you can think of (in five minutes) to get the ball out of the pipe without damaging the ball, tube, or floor.





*Source: Adams, J.; Conceptual Blockbusting

THE GREAT AMERICAN VALUES TEST
ROKEACH, ROKEACH & GRUBE
PSYCHOLOGY TODAY, NOVEMBER 1984

Are Your Values in Order?

A national sample of American adults was asked to rank these 18 values in order of importance. To compare your value system with that of the typical U. S. citizen, rank the values in order of their importance as guiding principles in your life, from most important (1) to least important (18). A summary of the survey results appears later in this article.

	A Comfortable Life
	An Exciting Life
	A Sense of Accomplishment
	A World at Peace
	A World of Beauty
	Equality
	Family Security
	Freedom
	Happiness
	Inner Harmony
	Mature Love
	National Security
	Pleasure
	Salvation
	Self-Respect
	Social Recognition
	True Friendship
	Wisdom

BEST COPY AVAILABLE

8	**A Comfortable Life**
17	**An Exciting Life**
7	**A Sense of Accomplishment**
2	**A World at Peace**
15	**A World of Beauty**
12	**Equality**
1	**Family Security**
3	**Freedom**
5	**Happiness**
11	**Inner Harmony**
14	**Mature Love**
13	**National Security**
16	**Pleasure**
10	**Salvation**
4	**Self-Respect**
18	**Social Recognition**
9	**True Friendship**
6	**Wisdom**

A Values Sampler

Americans typically rank freedom very high (3), but they rank equality much lower (12). Is the average American much more interested in his own freedom than in the freedom of others?

BEST COPY AVAILABLE

A TEAM IS . . .

A team is a group of people who feel energized by their ability to work together, who are fully commited to a high level of output and who care about how each member feels during the work process.

TEAMBUILDING . . .

involves members examining the process they use in working together so that a climate can be created in which members' energies and resources are maximized and channeled toward problem solving and/or task completion.

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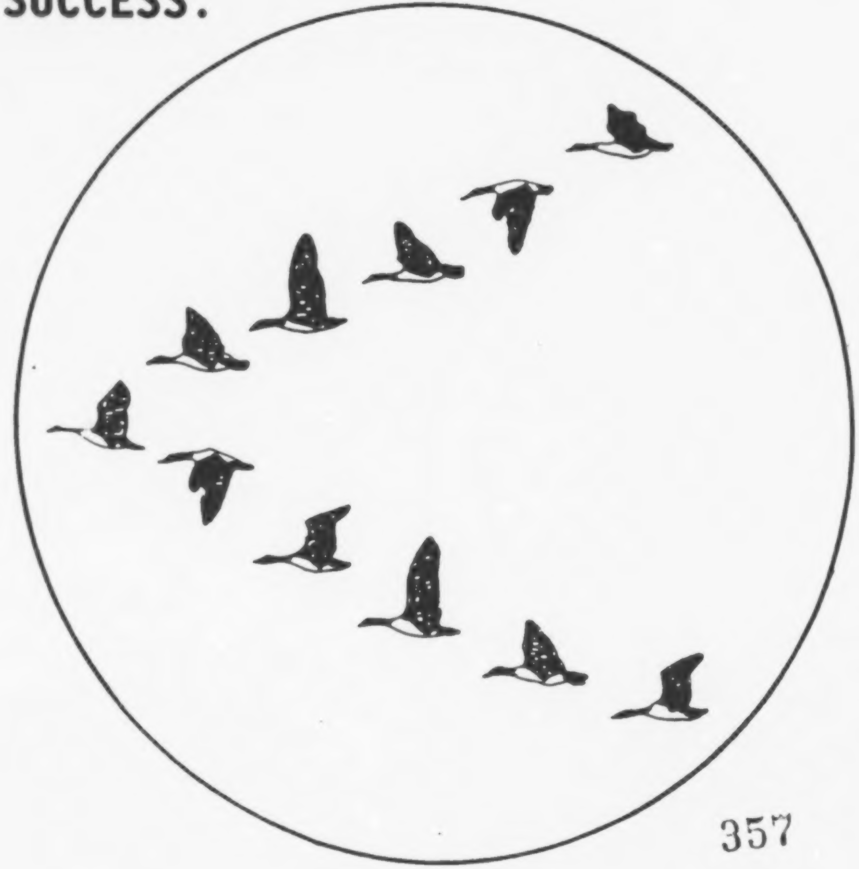
COMING TOGETHER IS A BEGINNING;

KEEPING TOGETHER IS PROGRESS;

WORKING TOGETHER IS SUCCESS.



TOM PETERS WORKING WOMEN SEPT. 1990
"FEMALE ADVANTAGE"

* HIERARCHY IS OUT

* COMPANY IS NO LONGER THE CENTER OF THE UNIVERSE

* THE TEAM ALWAYS COMES BEFORE THE STAR

* THE NEW JOB IS NEVER DONE

* PROCESS IS AT LEAST AS IMPORTANT AS RESULT

* VALUES DOMINATE RULES

* VOLUNTEERISM UNDERPIN'S THE COMPANY'S PACT WITH EVERY EMPLOYEE

* EMPLOYEE EMPOWERMENT DETERMINES MANAGERIAL SUCCESS

* TEAMWORK LEADS TO SUCCESS

* LOVERS OF AMBIGUITY SHINE

PERHAPS THE MOST VALUABLE
RESULT OF ALL EDUCATION IS THE
ABILITY TO MAKE YOURSELF DO
THE THINGS YOU HAVE TO DO,
WHEN THEY OUGHT TO BE DONE,
WHETHER YOU LIKE IT OR NOT.
THIS IS THE FIRST
LESSON TO BE LEARNED.

DO WOMEN MANAGE DIFFERENTLY?

Yes, says a new wave of thinking—and they're far better suited than men to run companies in the Nineties. But purveyors of the theory aren't doing women any favors. ■ *by Jaclyn Fierman*

HERE'S A TWIST: Suddenly *men* have to worry about gender equality. A cadre of consultants, academics, and executives say Mr. Hardcharging Manager could soon be out of a job. In his place they see a more nurturing, empathic sort, a born consensus builder. She—emphatically she—shuns the trappings of power and prefers "centrarchies" to hierarchies. Best of all, she is simply being herself. The dust jacket of Sally Helgesen's recent book, *The Female Advantage*, a bible of this new brand of feminism, claims that with their superior management instincts, women "may be the new Japanese."

The idea is turning up all over. An article in e November-December *Harvard Business Review* says men and women manage in sharply different ways and suggests that the female approach is superior. A new study by headhunting firm Russell Reynolds Associates finds that leadership traits are more common in executive women than in executive men. What were once labeled women's weaknesses and cited as reasons they were ill suited for top jobs are suddenly the very traits *male* executives are expected to wear on their sleeves. "Gone are the days of women succeeding by learning to play men's games," declares Tom Peters, co-author of management's old testament, *In Search of Excellence*. "Instead the time has come for men on the move to learn to play women's games."

The assertion that women are ideally suited to the flattened organizations of the Nineties, where teamwork and a free flow of information are paramount, is sweet talk indeed. It is especially so considering the paltry progress women have made in the upper reaches of business: FORTUNE recently found that less than 0.5% of the highest-paid officers and directors in America's largest public companies are women ("Why Women Still Don't Hit the Top," July 30).

But beware the siren call. This lavish new

REPORTER ASSOCIATE *Laurie Kretchmar*

Counter-stereotypes Herb and Marion Sandler of Golden West: He's a softy; she's less forgiving.

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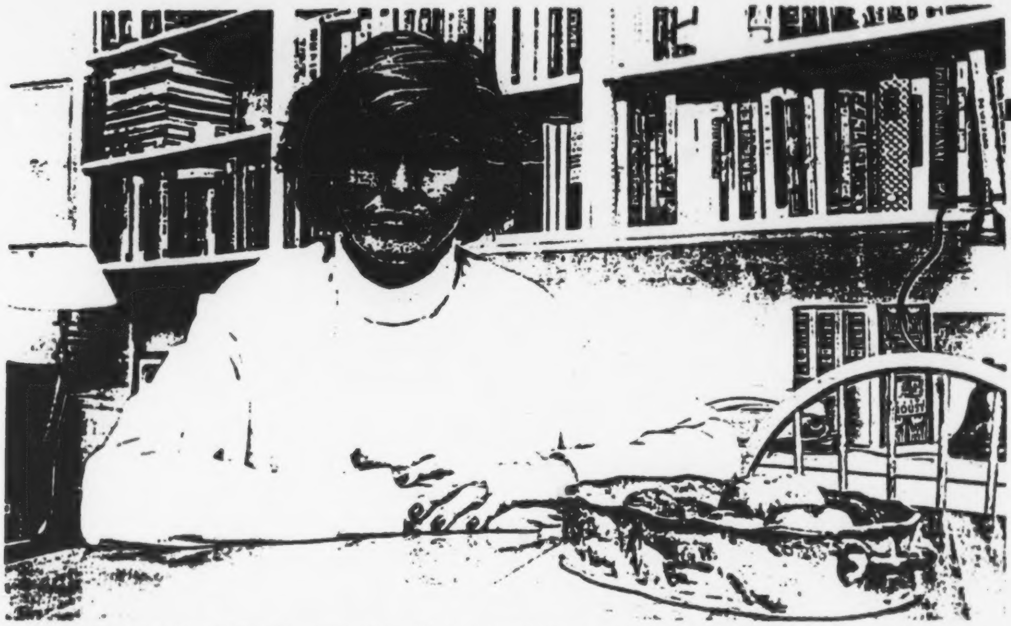


Author Helgesen believes "the management qualities needed today are built into the feminine psychology," while . . .

praise of women threatens to become a sea of fresh stereotypes. Says Jeffrey Sonnenfeld, who runs the Center for Leadership and Career Studies at Emory business school in Atlanta: "There's a scary orthodoxy about this new wave of feminism. It dictates that all women should behave in a certain way."

Strident as it is becoming, the new ideology has slim empirical underpinnings. In a thorough review of dozens of studies, Gary N. Powell, management professor at the University of Connecticut, concluded that the similarities among men and women managers far outweigh the differences. "Managers are a self-selecting population," he says. "Those who choose managerial careers, like firefighters, have a lot in common. The best embody stereotypes of both genders."

NOT ALL WOMEN—not even all women who call themselves feminists—fall for the new line. For one thing, today's Ms. Corporate Success Story is no less a caricature than the navy-suited, floppy-tied, banter-with-the-best-of-'em careerist of the past. Says Cynthia Fuchs Epstein, sociologist and feminist author of the book *Deceptive Distinctions*: "Even if people are putting women on a pedestal now, it's still a mindless aggregation. The notion at the base of this debate is that women have a single personality. That doesn't capture the rich variation in people."

Consider the reverse stereotypes in Herb and Marion Sandler, the husband and wife team who run Golden West Financial in Oakland, California, a vibrantly healthy savings and loan. Says she: "I'm less likely to compromise than my husband is when people don't perform to our standards." Says he: "I'm what you'd call soft." But both describe themselves as organized and results-oriented, and call the notion of male and female management styles nonsense.

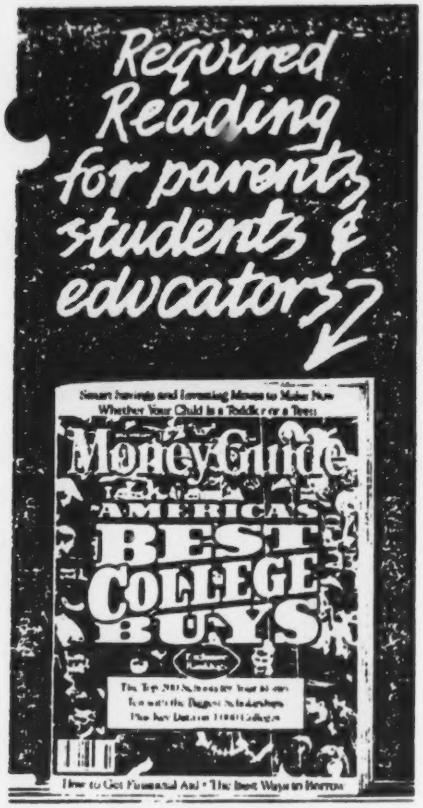
State the stereotype and watch the retorts fly. "Women naturally form centrarchies," says Anne Jardim, a dean of Simmons College graduate school of management in Boston, using a vogue term for nonhierarchical organizations with the at the center, not on . Counters Mina Gerowin: "If the situation warrants, I'd just as soon give orders." One of the first women vice presidents at Lazard Frères, Gerowin owns and manages specialty packaging companies as a partner in New Canaan Investments in Connecticut.

. . . Sonnenfeld says, "Nonsense. Why add to the stereotypes?"

Or try this new quick-and-easy distinction: Men hoard information, while women are natural disseminators. The idea is developed in detail in "Ways Women Lead," an article by Judy Rosener, management professor at the University of California at Irvine, in the current issue of the *Harvard Business Review*. "Oh, puleeeze," replies *Deceptive Distinctions* author Epstein, one of many people the *Review* invited to respond to Rosener's controversial findings. "Just think of how Aunt Tilly always withholds the single most important ingredient in her ap pie recipe."

And what about the movement's fav assertion—that women, mo ers in particular, are better team players than men? In *The Female Advantage*, Helgesen cites a woman entrepreneur who frames it this way: "If you can figure out which one gets the gumdrop, the 4-year-old or the 6-year-old, you can negotiate any contract in the world." Mary Anne Devanna, associate dean of Columbia University's business school, points up the irony: "For years we were told we couldn't possibly negotiate deals because we didn't play on Little League. Now they tell us the opposite."

On one issue most executive women seem to agree: They can't win in the workplace. Women are criticized for being too soft or too strident, while men behaving identically are perceived as sensitive ecisive. Most nettlesom women bosses is the job o ing orders. "An authoritative woman undercuts her femininity," says Deborah Tannen, a



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linguistics professor at Georgetown University and author of the current best-seller *You Just Don't Understand: Women and Men in Conversation*. "If she lives up to female stereotypes, she undercuts her authority." Take the example of a boss who needs a subordinate's report fast. *He* has no problem saying, "Have this on my desk by the end of the day." *She*, by contrast, is more likely to say: "I'm sorry to rush you, but do you think you could have this for me by the end of the day?" The senior woman who has learned to walk the tightrope of acceptable behavior might give the order this way: "I need this by the end of the day and would really appreciate your doing it."

Tannen: "Men and women may have different linguistic styles."

American cultural stereotypes may affect the way we communicate, but power knows no gender: Women like it and wield it just as well as men do. "Simply because women have biases to contend with doesn't mean they're wired differently," says Emory business school's Sonnenfeld. Tomas Kirchhausen, a molecular biologist at the Harvard medical school, agrees. "Speaking as a scientist," he says, "the human brain is genderless."

THE LATEST management theories favoring flatter organizations with authority less concentrated at the top simply represent the most effective way to run a business in an era of increasing global competition. It is no more feminine than the more hierarchical, autocratic style was masculine, and no less dominated by men. The most likely to succeed are not necessarily women but those of either gender best able to adapt to the tribe's customs.

"I didn't feminize Ford," says Nancy Badore, a psychologist who helped the car manufacturer change its autocratic corporate culture to a more participative one. Nonplussed to find herself receiving so much attention as a prime example of the new feminist dogma in Helgesen's book, Badore says most of the people she coached were men: "Even with their highly autocratic background, they opted for a more participative approach when they could see the payoff on the bottom line."

Though well meaning, the women-make-better-managers crowd risks diverting corporate America's attention from a critical issue in the workplace: discrimination, however subtle, against women and minorities. "This is a great lightning rod for other mistakes we might make in dealing with our increasingly diverse work force," says Sonnenfeld. "We ought to concentrate on trying to get different races and sexes to work together without adding to the stereotypes." In other words, let's not value women any less, but equality more. F

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WINTER 1991

FOR ALL THOSE BORN BEFORE 1946

WE ARE THE SURVIVORS...CONSIDER THE CHANGES WE HAVE WITNESSED

We were born before television, before penicillin, before polio shots, frozen food, Xerox, plastic, contact lenses, Frisbees and the PILL!

We were born before radar, CREDIT cards, split atoms, laser beams and ball-point pens, before panty-hose, dishwashers, clothes dryers, electric blankets, air conditioners, drip-dry clothes and before man walked on the moon.

We got married first and then lived together. How quaint can you be?

In our time, closets were for clothes, not for "coming out of." Bunnies were small rabbits and rabbits were not Volkswagons. Designer Jeans were scheming girls named Jean or Jeanne, and having a meaningful relationship meant getting along well with our cousins.

We thought fast food was what you ate during Lent, and Outer Space was the back seats of the Riviera Theater.

We were before house-husbands, gay rights, computer dating, and dual careers and commuter marriages. We're before day-care centers, group therapy and nursing homes. We never heard of FM radio, tape decks, electric typewriters, artificial hearts, word processors, yogurt and guys wearing earrings. For us, time sharing meant togetherness - not computers or condominiums; a chip meant a piece of wood; hardware meant hardware and software wasn't even a word!

In 1940, "made in Japan" meant junk and the term "making out" referred to how you did on your exams. Pizzas, "McDonalds" and instant coffee were unheard of.

We hit the scene when there were 5 and 10 cents stores, and where you bought things for five and ten cents. Ice cream cones were sold for a nickel or a dime. For one nickel, you could ride a street car, make a phone call, or buy a Pepsi or enough stamps to mail one letter and two post cards. You could buy a new Chevy coupe for $600.00, but who could afford one: a pity too, because gas was 11 cents a gallon!

In our day, cigarette smoking was fashionable, GRASS was mowed. COKE was a cold drink and POT was something you cooked in. ROCK MUSIC was Grandma's lullaby and AIDS were helpers in the Principal's office.

We were certainly not before the difference between the sexes was discovered but we were surely before the sex change: we made do with what we had! And we were the last generation that was so dumb as to think you needed a husband to have a baby!

BUT WE SURVIVED...WHAT BETTER REASON TO CELEBRATE?

Jan 1991.doc Social Committee

Chapter 1

Zen Leadership

The Human Side of Total Quality Team Leadership

The Mission

The mission of this book is to establish a foundation for developing a Total Quality Enriched Environment. The mission will become a living document through the active involvement of the reader that begins with a better understanding of what Total Quality Leadership processes are. Once an organization starts utilizing TQL processes, no one will ever again feel that "management doesn't listen." The major objective of this book is to guide individuals toward establishing **the right frame of mind**, based on the human side of ethical behavior. This **ethical behavior** combined with technical and conceptual skills are essential for the **success of quality improvement and problem solving teams.**

Guiding Principle:

It is important to understand that Total Quality Leadership is **"A Way of Life."** The process starts and ends with "Never Ending Improvement" of **people, process, product and service.** The never ending improvement principle must be governed by **trust**. This **trust principle** drives people to work in harmony toward the overall mission. **Satisfying the needs of the customer is the only agenda.**

Values:

This book builds upon the theories of futurist Joel A. Barker, behavioral scientists Maslow, Herzberg, McGregor, Glasser and Berns, people specialists Buscaglia, Carnegie, Covey and Dennis Waitley, andquality coaches Ishekawa, Deming, Juran, Crosby, Conway, Costelia and Imai. This list must also include the works of Tom Peters, Robert Waterman, and Myron Tribus.

The nexus of all activities is quality. This author believes that no one defines quality better than Myron Tribus. Dr. Tribus simply states that **"Quality is Love"** and I would add that we must have a love affair with quality. Quality is what we provide, and no one but the customer can define what quality is or is not. **Quality is not free,** it takes financial support to train people to work in harmony towards never-ending improvement. However the gains and rewards can off set the initial financial support. There is no quick fix, it we take long-term commitment (which includes financial support) to develop a process of never-ending improvement. This process must be based on trust and directed toward a common goal that benefits all stakeholders.

To the Reader: *(The Customer)* This book is not only a guide to the development of Total Quality Enriched Environments, but it also offers the reader insight into Total Quality Leadership. Furthermore, it offers the reader a guide to developing the leadership behaviors that are needed for schools, hospitals, banks, manufacturers and any type of business, profit or non-profit, to maintain and improve their effectiveness.

Total Quality Leadership: A total quality leader is one who has the **ability** to **encourage people** to work together toward a **common goal,** with **enthusiasm,** and **commitment** while still maintaining **social responsibility**. The total quality leader is a Zen leader (Zen meaning good). This concept of leadership is based on holistic principles. These principles are a common practice; to a total quality leader, they are a way of life. They become a habit.

How to make major improvements: Just change your paradigm!

Many individuals have discovered that they can make major self-development improvements by changing their paradigms. A paradigm is a way of thinking; it is a mental model. A good way to view a paradigm is to look at it like a road map. A paradigm gives you the mental direction needed to get where you want to be. People either have a good mental set of directions, or they get lost because their road maps are outdated. People and organizations need to be provoked to examine their paradigms.

We cannot solve today's problems with yesterday's solutions. Our present problems are a result of our present paradigms. These problems cannot be solved by using an outdated road map. We must think critically and creatively. Critical and creative thinking is not possible when we choose to live with paradigms that are outdated.

Believing that "our way is the only way" will keep our organizations from growing to face tomorrow's challenges. In many cases our present way of thinking is outdated. We can't solve problems just by working harder. Our present way of thinking may not only be keeping our organizations from growing, but us as well. The old paradigm **"if it ain't broke, don't fix it," must be replaced with the paradigm of the 90's and beyond, "if it ain't broke, improve it." I believe the 90's will be the decade of improvements in every** aspect of our society.

The foundation of organizational and individual failure lies in the way we think. If an organization operates on the premise that all decisions are made at the top, it will have less success than one whose employees have made a paradigm shift to a holistic way of thinking. **Holistic thinking** empowers people at all levels of the organization to make decisions that affect their work process.

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Holistic organizations empower all people to work together toward a common goal. Holistic organizations have a vision and a commitment that involve all people in achieving higher levels of effectiveness.

The Human Side of Total Quality Leadership will offer readers an opportunity to take a better look at their actions and behavior. It is the Zen leader who understands that quality improvement begins with the improvement of self and that quality products, services, and communities are the result of **quality people.**

This book is designed to guide a quality improvement team toward the improvement of their **technical**, conceptual and **human relations skills.** The driving force of these skill is a positive attitude. This attitude has most likely advanced to a quality way of thinking as a result of many positive paradigm shifts. Quality technical, conceptual and human relations skills are essential for effective team performance.

The **technical skills** that the book will focus on are those that are essential for improving problem solving. These skills will be presented in Chapter 8. The **conceptual** skills that deal with thinking creatively and developing a successful future will be focused on through out the book, however, Chapter 1,2, 4 and 5,deal with conceptual skills. The **human skills** are also covered through out this book. Chapters 3, 6 and 7 are focused on these skills.

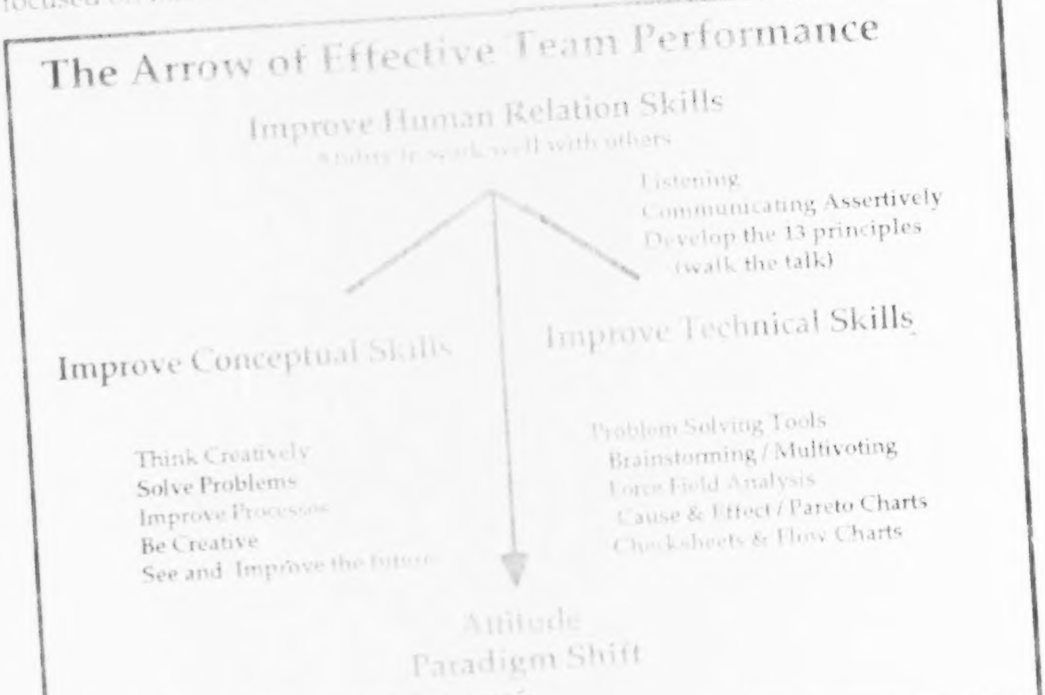
The Arrow of Effective Team Performance
Improve Human Relation Skills
Ability to work well with others
Listening
Communicating Assertively
Develop the 13 principles
(walk the talk)
Improve Conceptual Skills
Improve Technical Skills
Think Creatively
Solve Problems
Improve Processes
Be Creative
See and Improve the future
Problem Solving Tools
Brainstorming / Multivoting
Force Field Analysis
Cause & Effect / Pareto Charts
Checksheets & Flow Charts
Attitude
Paradigm Shift

Fig. 1.1. Arrow of Effective Team Performance

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The Traditional Functions of Management:

Any good manager understands the value of **planning, organizing, staffing, directing and controlling.** This book supports the traditional management functions, however, these functions will be governed by a new paradigm. This paradigm is driven by customer satisfaction both internal and external. It is based on the understanding that any thing worth doing is worth improving. Traditional functions where designed to make organization efficient. Efficiency formally meant to do things that made the bottom line look favorable to the stockholders. When efficiency stands alone without any competition, it may appear to be favorable. However, when efficiency attempts to compete it cannot stand along.
What may have appeared to be efficient in the past may not be effective for the future. In the past we managed to be efficient. The new paradigm will be to lead in order to become and stay effective. When organizations choose to become effective they have chosen to go beyond efficiency.

The **planning function** will be holistic, mission driven, quality focused and with only one agenda. The agenda will be to satisfy the customer, both internal and external. Profits and success will be a result of long-term commitment to customer satisfaction.

The **organizing function** will be to organize teams to work together to solve problem and create improvement projects that are in aligned with the mission. We will organize processes that deliver services and products on time, every time, while meeting the needs of the customer.

The **staffing function** will be to staff and train individuals to understand the benefits of holistic concepts of never-ending improvement. People will learn the value of trust, honesty, respect dignity and how to work in harmony with diversity.

The **directing function** will no longer be able to afford the high cost of autocratic leadership. The paradigm is that of leading people and controlling things. The Zen leaders will lead people toward an agreed upon mission that is customer driven and quality focused. All stakeholders will understand the desired outcome. The Zen leader will encourage people to work together toward the desired outcome with commitment that is free of hidden agendas. The Zen leader will develop partnerships that work toward improving everything worth improving.

The **control function** will control process and not people. The control function will allow individuals to know what the consequence is if processes are not controlled. People need to be empowered to control and improve processes.

Zen leader knows that systems must empower people to make improvements. However, they also know that if people choose not to be team players there must be consequences that impact that behavior. Zen leaders understand that there must be a balance between what needs to be empowered and what needs to be controlled. This is why guiding principles are necessary and the Zen leader lives the following principles.

Uzelac's "Baker's Dozen"
Principles for Developing a Total Quality Enriched Environment.
"A Total Quality Zen Leadership Concept"

A Total Quality Zen Leadership process is one that has clearly defined **outcomes.** If the outcome desired is a "Total Quality Enriched Environment," the process must be governed by clearly understood principles. However, these principles must become **"A Way Of Life."** These principles must become part of your value system, your attitudes and your beliefs. They must become your way of doing and being. Zen leaders understand that process improvement begins with leading by example.

Total quality enriched environments are needed in every aspect of our society. Students need to have quality enriched classrooms. Workers need to have quality enriched offices, laboratories, factories and worksites. These principles apply to every person in every sector of our society.

The 13 principles for a Total Quality Enriched Environment are:

- **Love**
- **Perfection**
- **Open Communications and Listening**
- **Giving Credit**
- **Respect**
- **Boundaries**
- **Quality**
- **Commitment and Purpose**
- **Trust and Assertiveness**
- **Criticism**
- **Cooperation**
- **Value and The Art of Giving**
- **Involvement**

Love

1. The first principle is the foundation of a **total quality enriched environment**. It is the principle of **"Love."** In order to assure quality, love must be part of the process. This principle is based on the premise that people must love doing what they are doing in order to guarantee a quality outcome. Love is present when the customers' needs are satisfied. Not only do people need to love what they are doing, but they also have to understand that the highest level of love is the love that they give to one another.

Commitment and Purpose

2. The second principle is **"Commitment and Purpose."** The quest for improvement must be never-ending. Commitment and love go hand-in-hand. Commitment has no strings attached. It is free of self-vested interest and political games. This principle is based on the premise that "what is good for the customer is good for me." Everyone in the process must be committed to the overall purpose, mission or vision - this is the desired outcome to which everyone is focused. This principle requires an authentic commitment toward the stated mission. Everyone must have a purpose in life and the commitment of making that purpose a living document.

Perfection

3. The third principle is **"Perfection."** This principle is based on the premise that everything can be improved. Anything worth doing, is worth improving. Change is a constant and in order to improve, things must change (including you). What appears to be perfect today will not be good enough tomorrow. With this concept in mind, people, organizations and communities can continue to grow and improve if they are willing to give up old paradigms. People must open their minds to new ways of thinking. This is not possible if they choose to live with paradigms that are outdated. Believing that what they are doing is perfect will keep them from growing to tomorrow's challenges, and will deny them opportunities for growth.

Trust and Assertiveness

4. The fourth principle is **"Trust and Assertiveness."** A total quality enriched environment cannot be achieved without **trust**. This principle is based on the premise that everyone is committed to the same positive outcome. **Trust** is based on **honesty, being trustworthy** and other **assertive behaviors.** The art of being assertive is developing all of these thirteen principles into daily behaviors. Assertive people are those who are direct, honest, trustworthy, caring, sharing and purpose driven. These people don't waste time complaining over spilled milk; they want to get on with life and improve society in the process. They have high regard for social responsibility and are ethical leaders.

Open Communications and Listening

5. The fifth principle is **"Open Communications and Listening."** Open communications and listening is a broad principle. People must feel free to express their concerns without any repercussions. Everyone must encourage everyone else to communicate the obstacles that they face in attaining their

quality improvement goals. When communication is only top down, people who question the system appear to be negative. When " open communications and listening" are present, however, people are encouraged to question and to make positive suggestions. This principle is based on the premise that the more information that is available, the closer individuals are to improving the process. The quality of your life or organization will be determined by the quality of your communications. Quality communications is not limited to how well you communicate to others. Communications begins with how well you communicate and listen to yourself. This principle includes the ability to **"listen consciously."** Listening must be a conscious process. Individuals must be aware of the barriers that block real listening. They must free themselves of bias, prejudice, pre-judgment, old paradigms and the "I'm OK, you're not OK" syndrome.

Criticism

6. The sixth principle is **"Criticism."** Criticism should be avoided at all cost. This principle is based on the premise that total quality enriched environments will not exist in a culture of criticism. Criticism without positive reinforcement of a person's worth can destroy the potential for a quality enriched environment. Criticism needs to be viewed as a barrier that will keep organizations and people in reverse. Criticism tends to make people feel inferior. People will work against systems that judge them by subjective standards. Systems which ignore the psychological aspects of people though constant criticism and which erode human dignity, will lead some to the lowest rungs of the social ladder.

Giving Credit

7. The seventh principle is **"Giving Credit."** This principle goes hand-in-hand with principle six. In order to establish a total quality enriched environment, people will need positive recognition. The foundation of pride in workmanship is recognition for a job well done. People who are given authentic praise for a good job will continue to improve. This principle is based on the premise that "if you don't have anything good to say, don't say anything at all."

Cooperation

8. The eighth principle is **"Cooperation."** Cooperation is the key to developing a total quality enriched environment. People must cooperate with one another in the quest for quality outcomes. Cooperation is making others feel that they count and that they are important. When you give more of yourself than you expect in return, you will be viewed by others as a person who cooperates. People who are known for being cooperative are those who understand what it would be like to walk in the shoes of others. The objective of this principle is to move people from the position of "Me" to "We."

Respect

9. The ninth principle is **"Respect."** Cooperation and respect go hand-in-hand. When people have the ability to cooperate with one another, they build a bond of respect. When cooperation and respect are present, the outcome will be a total quality enriched environment. The principles of cooperation and respect are based on the concepts of being caring, sharing ,and committed to the overall mission.

Value and The Art of Giving

10. The tenth principle is **"Value and The Art of Giving."** People need to feel that what they are doing has value. They must see the value added to the process, product or service that they are providing. This principle is based on the premise of self-worth. All people have the need to feel that they are valued and that their work or purpose in life is worth their effort. People need to feel a sense of belonging through self-worth. People need to see the value that they add to the overall process and that the result of their effort is one of quality. When people feel valued, they rise to the level of **"giving."** Giving is sharing what you have learned with others. When people share their abilities, knowledge and skills with others, they are not giving what they possess away; but rather they are ensuring that their knowledge is spread to and used by others. This principle is based on the premise of lighting the candles of others. When you take your candle and use it to light another candle, there isn't less light; there is more.

Boundaries

11. The eleventh principle is **"Boundaries."** This principle is based on the premise of allowing people the freedom to make decisions that govern their work. This principle explains the concept of "you can't put quality in a box." People need the freedom to be innovative, creative, imaginative, to solve problems and to make decisions. The principle of boundaries is related to the concept of the "Box Theory." This theory explains that when a child comes into this world that child is placed into a box-shaped bassinet. The theory goes on to explain that when the child grows old and departs this world, we place him/her in another box. Therefore, boxes are helpful only to helpless infants or to those whose spirits' have left their "physical boxes." All of the other boxes in which we put people (classrooms, buildings, prisons cells, etc.) are designed for convenience, facilitation or confinement. Quality and positive outputs are hindered when walls are placed around an individual's abilities to use their creative minds. Just because we assume that people (including children) do not know much about a product, process, service or subject, does not mean that they

can not offer some positive input toward how it can be improved. Every person has unlimited potential that is craving to escape from the boundaries of others.

However, when this potential is not permitted or given the opportunity to surface, it will die. Potential is like a rainbow; rainbows are free to shine. In other words, don't keep rainbows in boxes. If people are kept confined in an environment that does not tap their God-given potential, they will never have the freedom or the opportunity to shine. People who have the freedom to shine are people who have made a difference.

Involvement

12. The twelfth principle is **"Involvement."** This principle is based on the premise that when people are permitted to be involved, they will have higher levels of satisfaction than those who are not permitted involvement. Active involvement will produce the attitudes that are essential for a total quality enriched environment. However, if people are not involved, most will become passive, apathetic, divided and dissatisfied. The absence of involvement will produce a "them-against-us mentality." Involvement will lead to people becoming autonomous quality team players.

Quality

13. The thirteenth principle is **"Quality."** Quality is **"love,"** and love is **"quality."** A higher level of quality will make for a happier customer and promote repeat business. When all of the principles become a way of life or a habit of behavior, the outcome will be a total quality enriched environment. Total quality enriched environments are needed in every aspect of our lives. People need quality schools, hospitals, factories, businesses, civic and social organizations. Quality is vital to the future of America. In order to guarantee quality, we need a society of "Quality People."

Conclusion:

The thirteen principles are the gateway to a better America, but are only building blocks in the foundation for a "Total Quality Leadership Environment." One must have an appreciation for and an understanding of the works of people like Edward Deming, Joseph Juran, Tom Peters, Joel Barker, Myron Tribus, Dennis Waitley, Stephen Covey, Dale Carnegie, Eric Berne, Douglas McGregor, William Glasser and Leo Buscaglia. This list is not complete. There are many excellent champions who have contributed to the quality movement.

Quality is not free. It takes love, commitment, trust, communications, recognition, cooperation, respect, self-worth, high ethical behavior, involvement, and above all, it takes "you." The choice is yours and, if you choose, **you can make a difference.**

Exercise:

Please answer the following questions. Be direct and honest.

1. Why do you work?

2. What is the mission of your organization?

3. What is your role in reaching the mission?

4. Who in the process do you need to assist you in accomplishing your task?
   (These are your internal suppliers, they provide a service for you)
   What are your expectations of your internal suppliers?

5. Who needs your services in the process?
   (These are your internal customers) What are their expectations of your services?

6. Do you need to be a team player? Why or why not?

7. How can you use this information for **self-evaluation?**

SESSION II

SESSION 2

TOPIC B

- The advantages of team problem solving
- Limitations of team problem solving
- Theory X, Theory Y and Maslow

Seminar Presentations

1. Presentation of ways to improve productivity - Peters video

2. Comments on "Teams" from the Memory Jogger

3. Responses from page 16 - Zen Leadership

4. Team work training - Hollow Square Exercise

Reading Assignment

1. Read pages in Zen Leadership: The Human Side of Total Quality Team Management

Project Assignment

WHY QUALITY IMPROVEMENT TEAMS?

A single person using process improvement techniques will make a difference. However, in today's competitive world a person working alone rarely has enough knowledge or experience to understand everything that goes on in a process. Therefore, major gains in quality and productivity improvements most often result from people working together. Process improvement teams pool their technical, conceptual and human relations skills together to solve problems or to improve existing processes. Some people refer to these as hardware, software and humanware skills. Over the years many organizations have invested their training dollars into hardware skills and not enough have been given to the software and humanware skills. We will refer to these skill as technical, conceptual and human.

Technical skills will include training in brainstorming, cause and effect analysis, problem solving, SPC, JIT, and pareto analysis. Conceptual skills will include understanding of any philosophy, theory, concept or practice that supports the overall team process. Human relations skills will include group dynamics, communications, listening, understanding behavior, dealing with conflict and working together.

IS TRAINING NECESSARY?

With proper training in the use of technical tools such as cause and effect analysis, conceptual skills such as the understanding of Theory X and Theory Y and human skill development , process improvement teams will be able to deal with problems never thought possible.

TRAINING PROCESS:

The training process is based upon the philosophy which recognizes individual people as total human beings who desire to participate in decisions affecting their quality of life.

This philosophy is supported by Douglas McGregor's Theory Y.

Douglas McGregor presents a convincing argument that most management actions flow directly from whatever theory of human behavior a manager holds. This theory supports the concept that what ever a manager believes about people will control the manager's actions. All decisions managers make will stem from assumptions about human behavior.

TWO SETS OF ASSUMPTIONS ABOUT HUMAN BEHAVIOR

Based on Douglas McGregor's Theory X and Theory Y.

THEORY X: TRADITIONAL ASSUMPTIONS:

- The typical person dislikes work and will avoid it if possible.
- The typical person lacks responsibility, has little ambition, and seeks security above all.
- Most people must be coerced, controlled and threatened with punishment to get them to work.

MANAGEMENT'S ROLE: If a manager's beliefs reflect Theory X assumptions, his/her role will be to coerce and control people. The assumptions that leaders make about people will determine the climate of the organization.

LEADERSHIP STYLE: With this set of assumptions the leadership style will most likely be AUTOCRATIC.

ORGANIZATION ENVIRONMENT: In an autocratic environment the managerial orientation is a formal, official authority. This authority is delegated by right of command over the people to whom it applies. Management believes that it knows what is best and the employee's obligation is to follow orders. It assumes that employees have to be directed, persuaded, and pushed into performance, and this is management's task. Management does the thinking; the employees obey the orders. This traditional view of management leads to tight control of employees at work.

RESULTS:	MANAGEMENT PRACTICES	EMPLOYEE BEHAVIOR
Based on:	. POWER . AUTHORITY . CONTROL	. OBEY . DEPENDENCY . SEPERATE AGENDA
Trust:	. LOW	. LOW
Cooperation:	. PASSIVE	. PASSIVE

Fig 5.1, Tradition Results

As a result, employees' performance is minimum and their behavior is passive. They seek security as their highest order need. They depend on the organization to make the right decisions to keep their jobs secure.

THEORY Y: MODERN ASSUMPTIONS:

- Work is as natural as play or rest.
- People are not inherently lazy. They have become that way as a result of experience.
- People will exercise self-direction and self-control in the service of objectives to which they are committed.
- People have potential. Under proper conditions they learn to accept and seek responsibility. They have imagination, ingenuity, and creativity that can be applied to work.

MANAGEMENT'S ROLE: If a manager's beliefs reflect Theory Y assumptions, his/her role will be to develop the potential in employees and help them release that potential toward common objectives.

LEADERSHIP STYLE: With this set of assumptions, the leadership style will most likely be SUPPORTIVE.

ORGANIZATION ENVIRONMENT: In a supportive environment, the managerial orientation is toward teamwork. Management is the coach that builds a better team. The employee response to this situation is responsibility. This approach depends on leadership instead of power. Through leadership, management provides a climate to help people grow and achieve the mission of the organization.

RESULTS:	MANAGEMENT PRACTICES	EMPLOYEE BEHAVIOR
Based on:	. COMMITMENT . SUPPORT . ZEN LEADERSHIP . PARTNERSHIP . EMPOWERMENT . MISSION	. OWNERSHIP . SELF-DIRECTION . RESPONSIBLE . TEAM PLAYER . ENTHUSIASTIC . COMMON AGENDA
Trust:	. HIGH	. HIGH
Cooperative:	. ACTIVE	. ACTIVE

Fig. 5.2. Team Results

As a result employees' performance is driven toward improvement. They seek self-actualization as their highest order of needs. They know that the future success of the organization will depend on their input to the process.

When employees are empowered to improve processes that promote quality improvement, they have an opportunity to satisfy their highest order of needs. When individuals work in an environment that creates opportunities for self-fulfillment, employees' behavior will be in alignment with the mission of the organization.

Maslow's Hierarchy of Needs:

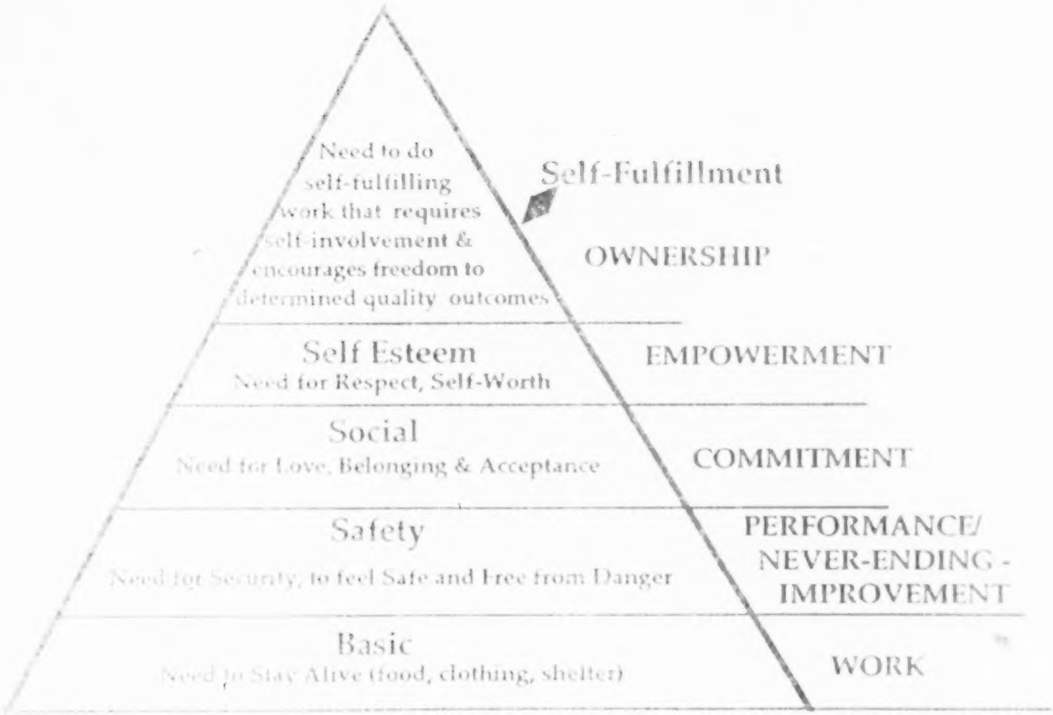
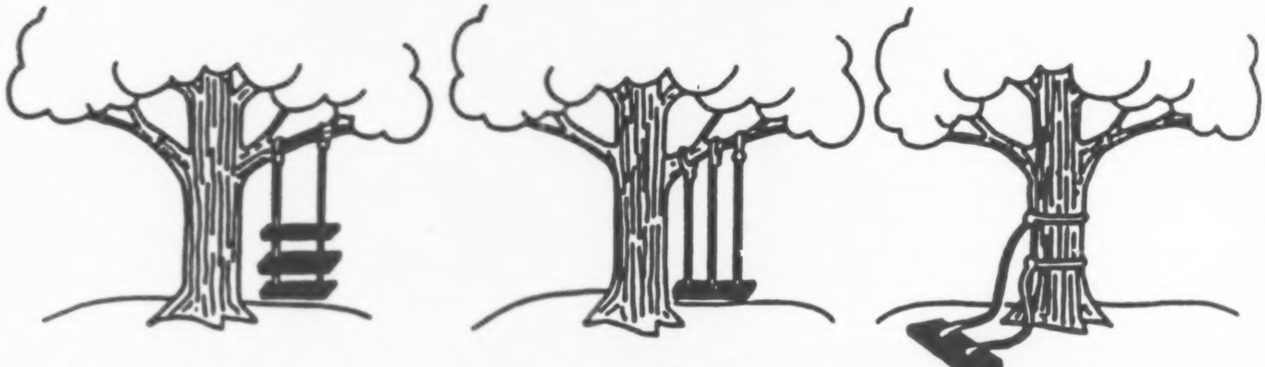

Need to do self-fulfilling work that requires self-involvement & encourages freedom to determined quality outcomes
Self-Fulfillment
OWNERSHIP
Self Esteem
Need for Respect, Self-Worth
EMPOWERMENT
Social
Need for Love, Belonging & Acceptance
COMMITMENT
Safety
Need for Security, to feel Safe and Free from Danger
PERFORMANCE/ NEVER-ENDING - IMPROVEMENT
Basic
Need to Stay Alive (food, clothing, shelter)
WORK

Fig. 5.3, Maslow's Needs

In order to survive in today's world most people must be able to earn money. Earning money has become the means for survival. Up until recent years most organizational leaders believed that money was the only thing that motivated employees. I believe that most people work for money, because of their need for survival. According to Frederick Herzberg money is what is needed to provided the means for satisfying our basic needs, however, it has nothing to do with motivation. People are either satisfied or dissatisfied with money and in most cases they are dissatisfied.

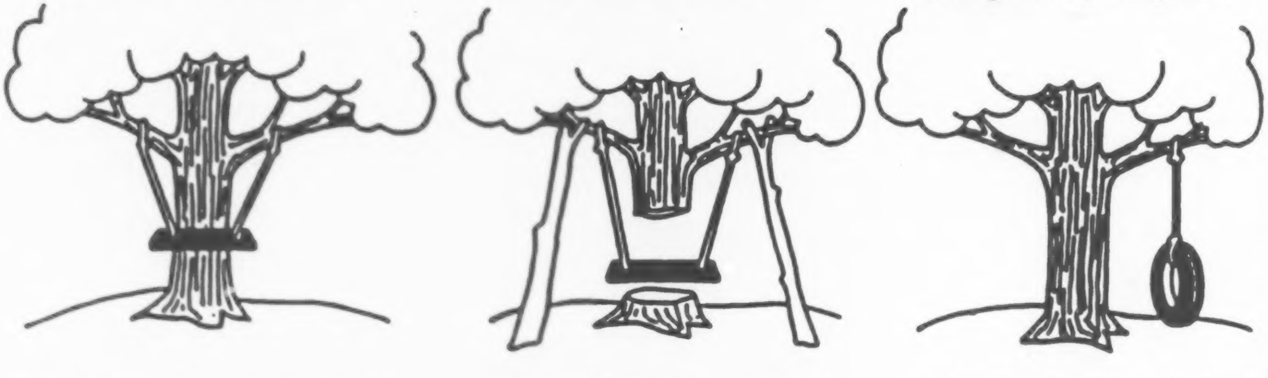
FIGURE 6-6 LATERAL COMMUNICATION RUNS AMOK



As The Rep Requested It

As Sales Ordered It

As Engineering Designed It



As The Plant Manufactured It

As The Contractor Installed It

What The Customer Wanted

HOLLOW-SQUARE OPERATING-TEAM BRIEFING SHEET

1. You have the responsibility of carrying out a task according to instructions giv by your planning team. Your task is scheduled to begin no later than twenty-fi minutes from now. The planning team may call you in for instructions at a time. If you are not summoned, you are to report anyway at the end of this p riod. No further instructions will be permitted after the twenty-five minutes h elapsed.
2. You are to finish the assigned task as rapidly as possible.
3. While you are waiting for a call from your planning team, it is suggested that y discuss and make notes on the following questions.
    a. What feelings and concerns are you experiencing while waiting for i structions for the unknown task?
    b. How can the four of you organize as a team?
4. Your notes recorded on the above questions will be helpful during the discussi following the completion of the task.

HOLLOW-SQUARE OBSERVER BRIEFING SHEET

You will be observing a situation in which a planning team decides how to solve a problem and gives instructions on how to implement its solution to an operating team. The problem is to assemble sixteen pieces of cardboard into the form of a hollow square. The planning team is supplied with the key to the solution. This team will not assemble the parts itself but will instruct the operating team how to do so as quickly as possible. You will be *silent* throughout the process.

1. You should watch the general pattern of communication, but you are to give special attention to one member of the planning team (during the planning phase) and one member of the operating team (during the assembling period).
2. During the planning period, watch for the following behaviors:
    a. Is there balanced participation among planning-team members?
    b. What kinds of behavior impede or facilitate the process?
    c. How does the planning team divide its time between planning and instructing? (How soon does it invite the operating team to come in?)
    d. What additional rules does the planning team impose upon itself?
3. During the instructing period, watch for the following behaviors:
    a. Which member of the planning team gives the instructions? How was this decided?
    b. What strategy is used to instruct the operating team about the task?
    c. What assumptions made by the planning team are not communicated to the operating team?
    d. How effective are the instructions?
4. During the assembly period, watch for the following behaviors:
    a. What evidence is there that the operating-team members understand or misunderstand the instructions?
    b. What nonverbal reactions do planning-team members exhibit as they watch their plans being implemented.

Chapter: 5
Introduction to Quality Improvement Teams

Learning Objectives:

- **Introduction to Quality Improvement Teams and their relationship to Dr. W. Edwards Deming.**
- **To establish an understanding of management theory that supports Quality Improvement Teams.**
- **To establish an understanding of Deming's fourteen obligations of management.**

INTRODUCTION:

The purpose of this chapter is to assist organizations in the development of or the improvement of quality improvement teams. One of the many objectives of this book is to assist organizations or people who want to become quality conscious. This process is built on the philosophy that "anything that is, can be improved." **In other words "if it ain't broke, improve it."**

The improvement process will work and can be applied to any organization or community. The concepts, practices or principles can apply to manufacturing, retailing, health. education, any government or social agency. Any place we have people working, the process can be improved, with the use of teams.

MISSION

The mission of quality improvement teams is to give people influence and empowerment over their work. The goal of process improvement teams is to improve quality and productivity.

WHAT ARE QUALITY IMPROVEMENT TEAMS?

A quality improvement team is composed of a team of people from the same work area or with the same interest, who voluntarily meet together on a regular basis to identify improvement areas or to solve problems. The philosophy behind process improvement teams is that people closest to the job often have the experience and knowledge needed to come up with the best solutions to job-related problems.

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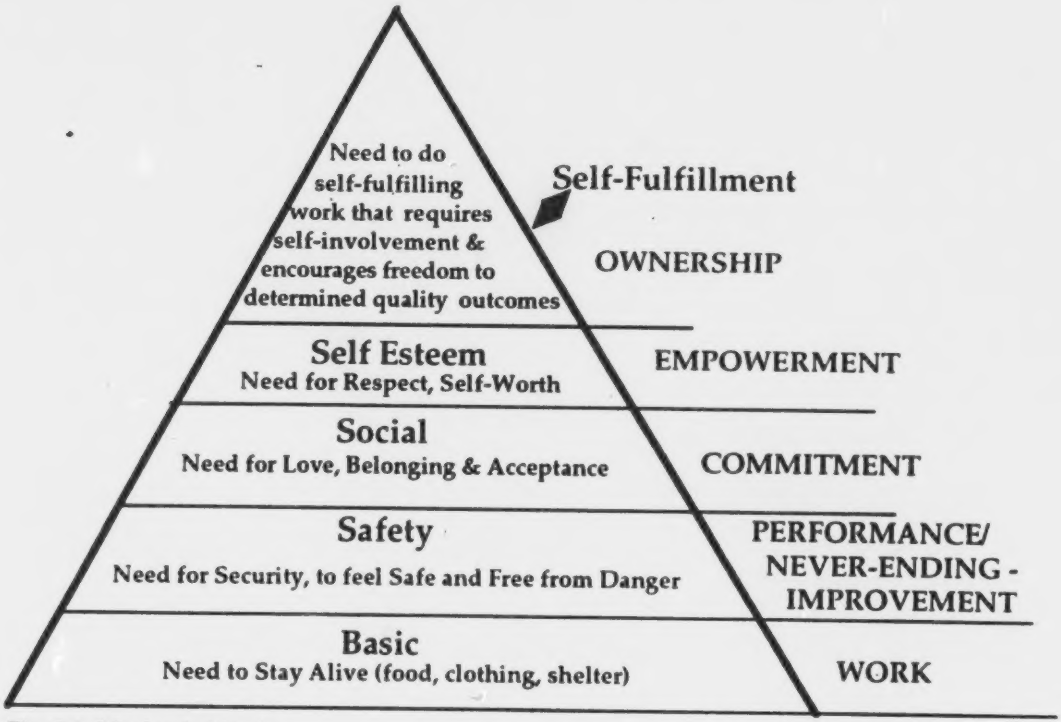
Need to do self-fulfilling work that requires self-involvement & encourages freedom to determined quality outcomes
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Need for Respect, Self-Worth
EMPOWERMENT
Social
Need for Love, Belonging & Acceptance
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When individuals have a sense of self-fulfillment that has resulted from their own individual effort they will be motivated to continue to satisfy their higher order of needs. When individuals feel that their efforts are appreciated they will be motivated to continue to satisfy the need for self-worth. When individuals feel they belong to an environment that is committed to their welfare they will be motivated to give their best.

The higher-order needs have a better opportunity for satisfaction in environments that have committed to the concepts of Total Quality Management. When organizational leaders empower people to make decisions that promote never-ending improvement they will create a culture that permits ownership. When individuals take ownership of their work they will find many challenging opportunities to improve the processes they control.

Performance is the key to the need satisfaction. When people take total responsibility for their actions and work in alignment with the mission they will discover many opportunities for self-improvement. Through self-improvement we find a higher sense of security in our own abilities to improve anything worth improving.

Employees will have more opportunities to satisfy their needs in an environment that is customer driven and quality focused. When employees needs are satisfied they well transform their satisfaction toward satisfying the needs of the customer. It is difficult for anyone to satisfy the needs of others if their needs are not fulfilled.

SURVEY:

In a survey conduct by MIT"s Sloan School of Management, over 1000 customers were asked what "quality in services" meant to them. The largest group, one-third, named employee contact skills such as courtesy, attitude, or helpfulness.

PROBLEM:

Many employees who deal with customers do not care about satisfying them. At best, they fail to create an impression good enough that customers recommend the firm to others. At worst, they cause customers to take their business elsewhere.

CAUSE:

As a result of inadequate training many employees just don't know any better. Furthermore, if the employees needs are not being met they will have difficulty taking ownership of their environment.

IMPACT:

Employees have a difficult time coping with the lack of need satisfaction so they are always in search of something that will satisfy their needs. Some will be involved in looking for a better job, and others may involve themselves in activities that are not in alignment with the business.

What are some activities that people get involved in when their needs are not being met?

SOLUTION:

To a large extent, firms can assure quality in high contact service settings by training employees **how** to treat customers respectfully. However, if employees are not meeting their basic needs, they will have a difficult time satisfying the needs of the customer.

You must treat your internal and external customers will equal importance.

REGAINING THE COMPETITIVE EDGE

Why do some companies fail and others succeed?

The difference is not automated production systems, robots, cheap labor, or superior work ethic. The major difference is in **management's philosophy and the system** in which they manage.

Managers must be willing to question their present system. They must challenge their way of thinking, their traditional methods of working with people, planning, controlling, and making decisions.

DR. W. EDWARD S DEMING often confronts managers with the idea that 85% of quality problems are created by management, and not the hourly worker. What he means is that the hourly worker (the sales clerk, secretary, file clerk, factory worker, or a host of others) does not have control over all the decisions that design the system. Managers set the policies that control how equipment, parts, materials and machinery are purchased.

W. Edwards Deming is an internationally renown consultant who is best known for his work in Japan, which revolutionized Japanese quality and productivity. Dr. Deming's philosophy and methods were largely responsible for the success of Japanese industry today.

DEMING'S MANAGEMENT PHILOSOPHY

Develop the Organization's Goals and Philosophy:

Create constancy of purpose toward improvement of product and service with a plan to become or stay competitive, stay in business, and provide jobs.

The process starts with the development of a mission statement. The mission statement must become a living document that is understood by all employees. Socializing all employees to the mission statement is needed to begin the " Journey to Excellence."

KEY ELEMENTS FOR NEVER-ENDING IMPROVEMENT

1. **Develop a Mission Statement for Never-Ending Improvement**:
2. **Management Leadership:** Including direct participation by the senior management team in the formal system, as well as establishment of a quality mission statement, quality policies, and procedures.
3. **Organizing for Never-Ending Improvement:** Including establishment of a quality steering committee made up of labor and management to include senior management members, and a person or department responsible for supporting, tracking and measuring the improvement process.
4. **Education for Never-Ending Improvement:** Including awareness, team-building, and problem-solving skills.
5. **Develop sensitivity to customer expectations:** Develop a system that determines the method for continuously identifying customer expectations and satisfaction.
6. **Quantifying conformity for quality improvement:** Including defining and implementing measurements of quality performance.
7. **Communicate Never-Ending Improvement**: Develop a system that includes special events and team awards which recognize the importance of total quality service and improvement.

8. **Action for Never-Ending Improvement:** Develop a system that includes implementing prevention oriented improvement projects.

9. **Annual plan for Never-Ending Improvement:** Develop a system that involves recycling the Never-Ending Improvement philosophy.

Note: If you want to improve the effectiveness of a system, concentrate your attention on the processes of the system. Working on results will not produce good results. Effective results come only from effective processes. Remember-what may appear to be efficient (bottom line), may not be effective.

EXERCISE:
Identify the present forces that are guiding your organization toward positive outcomes and those that are hindering you (Use the force field analysis methods for each of the 10 elements.).
Do not let others in this workshop influence your analysis, each participant should work alone on her/his evaluation.

W. Edwards Deming (1986) suggests that leadership must replace supervision if organizations are to survive.

LEADERSHIP: Many authors have attempted to identify the traits that effective leaders possess. Harris, Hillenmeyer, and Foran (1989) completed a selected review of the literature regarding trait theory and identified the following traits as ones that most experts agree exist when true leadership is present.

1. VISION: What is the vision of your organization?

2. COMMUNICATION: Are you a visible force and effective communicator in your organization?

3. RESPECT FOR PEOPLE: Do your everyday actions as a leader demonstrate respect for people in your organizations?

4. KNOWLEDGE: Are you always attempting to increase your knowledge base and improve your leadership/supervisory skills?

5. BY EXAMPLE: Do you make a positive role model for others to follow?

6. CUSTOMER RESPONSIVENESS: Do you view customers as an interruption to your work day or as the essence of your work?

7. INNOVATION: Do you encourage innovation and creativity among your followers?

Zen leaders have the **ability** to **encourage people** to **work together** to seek the **objectives** of the organization with **respect, enthusiasm** and **commitment,** while still maintaining **social responsibility.** Zen leaders develop an environment that is rocketing into the future with a planned direction that everyone understands.

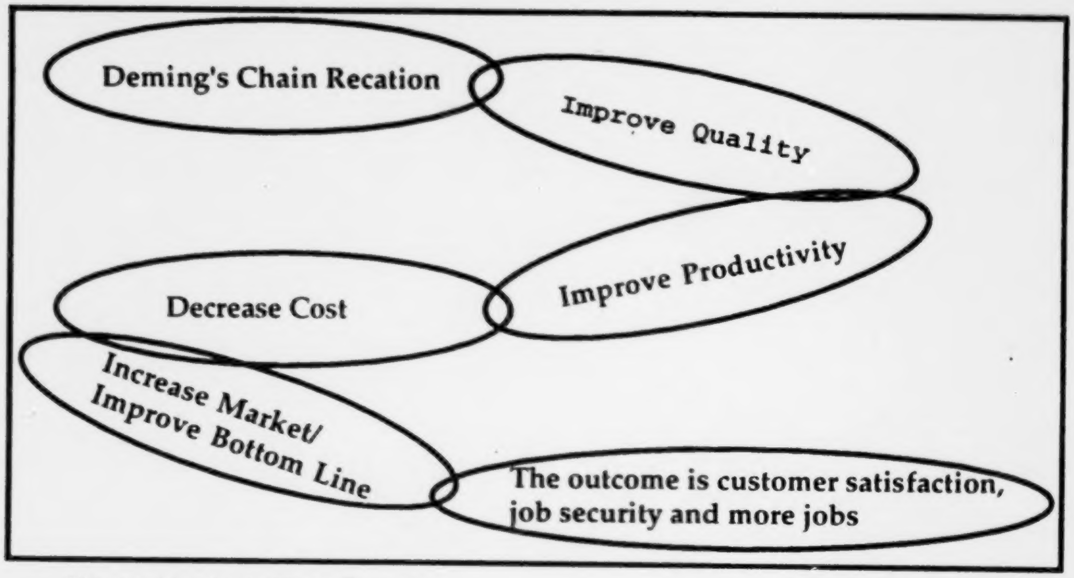

Deming's Chain Recation
Improve Quality
Improve Productivity
Decrease Cost
Increase Market/
Improve Bottom Line
The outcome is customer satisfaction,
job security and more jobs

Fig. 5.4, Deming's Chain Reaction

When workers are not performing or they are at odds with each other, it is management's responsibility to resolve conflict or improve the situation. The critical ingredient in any high-commitment, quality improvement environment is understanding and cooperation of the total management team. Only through the authority of management will roadblocks to improvement be removed.

DEMING'S FOURTEEN OBLIGATIONS OF MANAGEMENT

1. **Create constancy of purpose for improvement of product and service.**

2. **Adopt the new philosophy.**

3. **Cease dependence on inspection to achieve quality.**

4. **End the practice of awarding business on the basis of price tag alone. Instead, minimize total cost by working with a single supplier.**

5. **Improve constantly and forever, every process for planning, production, and service.**

6. **Institute training on the job.**

6. Institute training on the job.

7. Adopt and institute leadership.

8. Drive out fear.

9. Break down barriers between staff areas.

10. Eliminate slogans, exhortations, and targets for the work force.

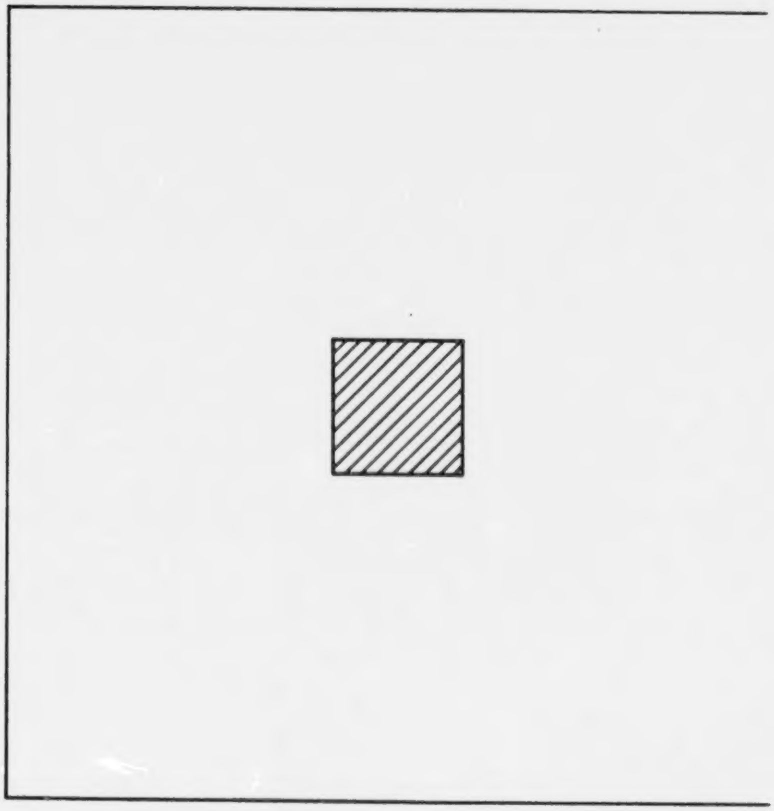
11. Eliminate numerical quotas for the work force and numerical goals for management.

12. Remove barriers that rob people of pride of workmanship. Eliminate the annual rating or merit system.

13. Institute a vigorous program of education and self-improvement for everyone.

14. Put everybody in the company (school, hospital or community) to work to accomplish the transformation.

HOLLOW-SQUARE PATTERN SHEET



HOLLOW-SQUARE PLANNING-TEAM BRIEFING SHEET

Each of you has an envelope containing four cardboard pieces which, when properly assembled with the other twelve pieces held by members of your team, will make a "hollow-square" design. You also have a sheet showing the design pattern and a Key Sheet showing how the puzzle pieces fit to form the hollow square.

Your Task

During a period of twenty-five minutes you are to do the following:

1. Plan to tell the operating team how the sixteen pieces distributed among you can be assembled to make the design.
2. Instruct the operating team how to implement your plan.

(The operating team will begin actual assembly after the twenty-five minutes is up.)

Ground Rules for Planning and Instructing

1. You must keep all your puzzle pieces in front of you at all times (while you both plan and instruct), until the operating team is ready to assemble the hollow square.
2. You may not touch other member's pieces or trade pieces during the planning or instructing phases.
3. You may not show the Key Sheet to the operating team at any time.
4. You may not assemble the entire square at any time. (This is to be done only by the operating team.)
5. You may not mark on any of the pieces.
6. When it is time for your operating team to begin assembling the pieces, you may give no further instructions; however, you are to observe the team's behavior.

SESSION III

SESSION 3

TOPIC C

- The scientific bases for teams
- Leadership styles are critical for successful team building

Seminar Presentation

1. Review reading assignment

2. Theory X & Y assessment exercise

3. Leadership style task or maintenance orientation

4. Advancing the mission - Quality Driven Designs

Reading Assignment

1. Memory Jogger for Education - page 66-69
2. Team Handbook

Project Assignment

1. Write 200 word essay on your leadership style (Theory X or Y, Task or Maintenance)

SATISFACTION SURVEY

Allen J. Schuh

Instructions: On the following list of twenty-five bipolar scales, you are to rate two different concepts: *"Myself Now"* ("M") and *"The Way I Would Most Want to Be"* ("I" for Ideal Self). Place an "M" on each scale in the space that best describes your feeling about that item as it pertains to you *now*. Then go back through the list and place an "I" on each scale in the space that best describes the way you *would most want to be* in terms of that item. It is possible for your "M" and "I" ratings to be the same.

Example:

Extremely Somewhat Slightly Neutral Slightly Somewhat Extremely

aggressive: __I__:__M__:____:____:____:____:____: defensive

In this case, the placement of the "Myself Now" concept on the scale of "aggressive-defensive" indicates that the individual sees himself or herself as "somewhat" aggressive now, but that he or she would like to be "extremely" aggressive.

Scales *Points*

hungry: ___:___:___:___:___:___:___ :not hungry 1. ______

sexually satisfied: ___:___:___:___:___:___:___ :sexually deprived 2. ______

sleepy: ___:___:___:___:___:___:___ :not sleepy 3. ______

impotent: ___:___:___:___:___:___:___ :energetic 4. ______

healthy: ___:___:___:___:___:___:___ :sickly 5. ______

secure: ___:___:___:___:___:___:___ :insecure 6. ______

striving: ___:___:___:___:___:___:___ :peaceful 7. ______

protected: ___:___:___:___:___:___:___ :attacked 8. ______

in danger: ___:___:___:___:___:___:___ :safe 9. ______

unopposed: ___:___:___:___:___:___:___ :threatened 10. ______

not allied: ___:___:___:___:___:___:___ :belonging 11. ______

with group identification: ___:___:___:___:___:___:___ :without group identification 12. ______

rejecting of group goals: ___:___:___:___:___:___:___ :accepting of group goals 13. ______

accepted socially: ___:___:___:___:___:___:___ :rejected socially 14. ______

displaced: ___:___:___:___:___:___:___ :having a place 15. ______

self-reliant: ___:___:___:___:___:___:___ :relying on others 16. ______

self-respecting: ___:___:___:___:___:___:___ :self-disrespecting 17. ______

self-contemptful: ___:___:___:___:___:___:___ :self-esteeming 18. ______

doubtful: ___:___:___:___:___:___:___ :confident 19. ______

independent: ___:___:___:___:___:___:___ :dependent 20. ______

feeling unfulfilled: ___:___:___:___:___:___:___ :feeling fulfilled 21. ______

repetitive: ___:___:___:___:___:___:___ :creative 22. ______

growing: ___:___:___:___:___:___:___ :shrinking 23. ______

unadapted: ___:___:___:___:___:___:___ :adjusted 24. ______

regressing: ___:___:___:___:___:___:___ :expanding 25. ______

SATISFACTION SURVEY SCORING AND INTERPRETATION SHEET

Scoring Instructions. Use the following steps to determine your score on the Satisfaction Survey.

1. Count the absolute number of points separating your "I" and "M" marks on each bipolar scale. The difference score is zero if "I" and "M" fall on the same scale point. A maximum score of six is possible on each scale.

2. Write the number of points separating "I" and "M" in the space provided at the right of each bipolar scale.

3. Add the number of points for the first five items and write that score in the space indicated on the Satisfaction Survey Profile Sheet. This discrepancy score is your dissatisfaction on Maslow's need level I, Basic. Plot this score by placing an "X" on the Need Strength Profile at the correct point for this need. Use the same procedure for each successive group of five items. Thus you will have an "X" on the profile sheet for each of five dimensions representing the five need levels: I (Basic), II (Safety), III (Belonging), IV (Ego-Status), and V (Actualization). Then connect your five "X"s with straight lines to obtain a graphic representation of your need strengths.

Interpretation

Your greatest unsatisfied need level is identified by your highest score on the Satisfaction Survey Profile Sheet: your "operating level," then, is the level at which there is the greatest discrepancy between where you are now and where you want to be.

The operating level will dominate your perception. It is most likely that you saw the words in the association exercise through the lens of your operating level. The word "money," for example, may be seen by one person as "paying the rent" but as "shows my status" to another. Pay, then, is not a higher or lower motivator except as it is perceived by the person in relationship to it. "A hero" tends to be seen as a "fool" to someone operating at the safety need level but as "someone to be like" to a person operating at the ego-status need level. "Independence" is demanded by someone at the ego-status level and feared by someone at the belonging level. We perceive the world and give it meaning in terms of our own needs.

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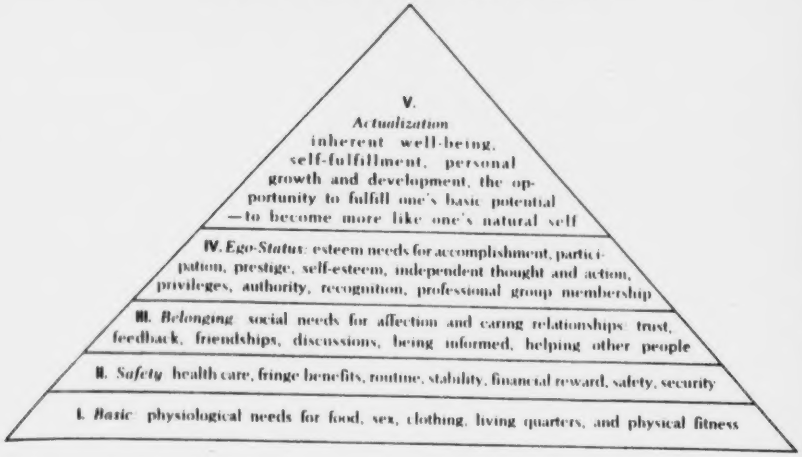
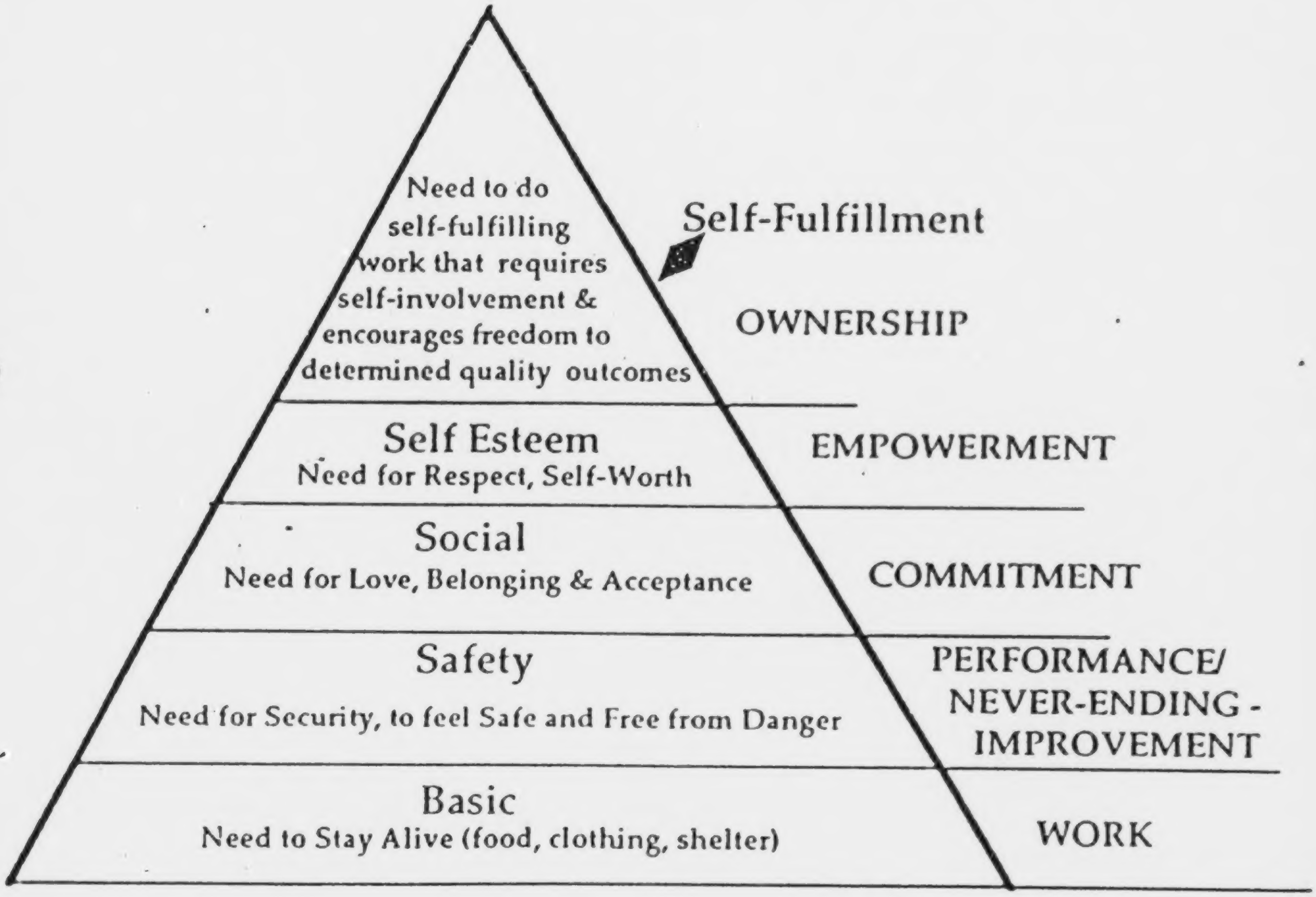
SATISFACTION SURVEY PROFILE SHEET


V.
Actualization
inherent well-being, self-fulfillment, personal growth and development, the opportunity to fulfill one's basic potential—to become more like one's natural self
IV. Ego-Status: esteem needs for accomplishment, participation, prestige, self-esteem, independent thought and action, privileges, authority, recognition, professional group membership
III. Belonging: social needs for affection and caring relationships: trust, feedback, friendships, discussions, being informed, helping other people
II. Safety: health care, fringe benefits, routine, stability, financial reward, safety, security
I. Basic: physiological needs for food, sex, clothing, living quarters, and physical fitness

Need Strength Profile

Items	*Score*	0	2	6	10	14	18	22	26	30	
21-25	☐										V. Actualization
16-20	☐										IV. Ego-Status
11-15	☐										III. Belonging
6-10	☐										II. Safety
1-5	☐										I. Basic

Maslow's Hierarchy of Needs:


Need to do
self-fulfilling
work that requires
self-involvement &
encourages freedom to
determined quality outcomes
Self-Fulfillment
OWNERSHIP
Self Esteem
Need for Respect, Self-Worth
EMPOWERMENT
Social
Need for Love, Belonging & Acceptance
COMMITMENT
Safety
Need for Security, to feel Safe and Free from Danger
PERFORMANCE/
NEVER-ENDING -
IMPROVEMENT
Basic
Need to Stay Alive (food, clothing, shelter)
WORK

THE SELF

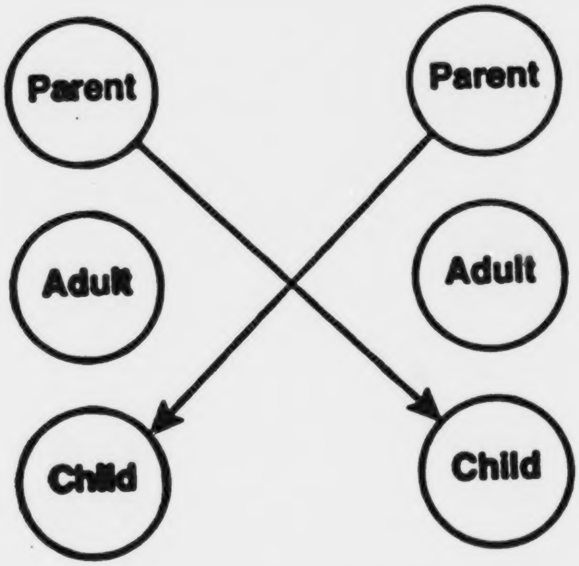
A person's self concept is strongly related to their earlier experiences

THREE CONCEPTS OF SELF

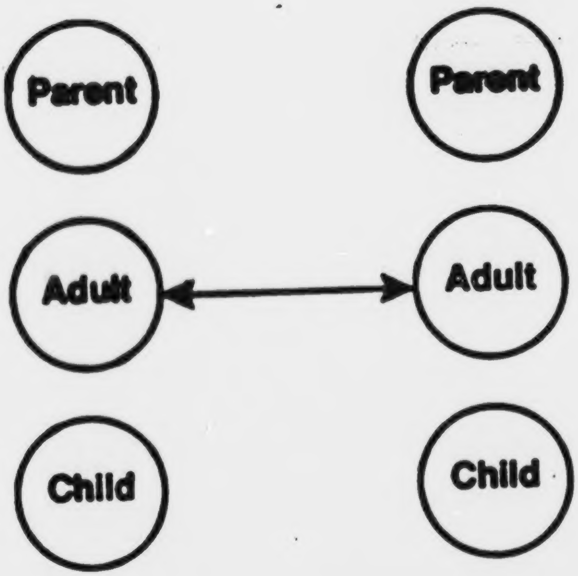
TEXTBOOK	TA	FREUD
PERSONAL SELF sense of uniqueness	CHILD feeling of emotion	ID emotion
SOCIAL SELF presenting yourself to others	ADULT scientific data processing	EGO rational
IDEAL SELF sense of what we wish to be	PARENT what we ought to be	SUPER-EGO conscience what we ought to be

T: 10.4

“TRANSACTIONS”


Parent
Parent
Adult
Adult
Child
Child

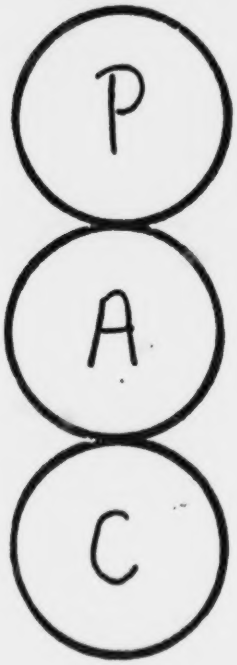
Undesired Communication Patterns


Parent
Parent
Adult
Adult
Child
Child

Preferred Communication Patterns

A RAPID OVERVIEW*

DEFINITIONS IN TRANSACTIONAL ANALYSIS (*Every person is made up of three parts:*)



Parent:	. **Critical** . **Nurturing**	Judgmental; critical of self and others; moralistic; directive and "how to" oriented; rigid; prejudiced; controlling of others, particularly by invoking guilt feelings; authoritarian-permissive; tradition bound; supportive; paternalistic.
Adult:		Logical; non-emotional; rational; objective; fact-oriented; calculating; funless; ageless; computer-like with constant data updating; probabilistic; here and now oriented.
Child:	. **Natural** . **Adapted**	Spontaneous; fun-loving; curious; creative; impulsive; stubborn; rebellious; manipulative· sulking; "poor me" dependency; reactionary; non-confronting; self-centered and self-pity

Two Types of Child Feelings

OK	Not-OK
. Loving	. Fear
. Caring	. Anger
. Laughing	. Sadness
. Happiness	. Rebellion
. Fun	. Hurt

Transaction: You do or say something to me; and I do something back.

Transactional Analysis: Analyzing that one transaction to see which part of each person is coming on: Parent, Adult, or Child.

Parent: Recordings in the brain of imposed, unquestioned, external events between birth and age 5; a taught concept of life; traditional; what Mom and Dad (*and significant other authorities*) said and did.

Child: Recordings in the brain of internal events (*feelings*) in response to external events between birth and age 5; a felt concept of life; emotional; also includes genetic recordings (*instincts and biological urges*).

Adult: Recordings of data acquired through independent exploration and testing; rational; a thought concept of life; a computer and data bank. Begins operating at age 10 months.

Game: An ongoing series of ulterior transactions progressing to a well-defined, predictable outcome, or payoff; basically dishonest; keeps people apart.

I'm Not OK -- You're OK: Universally, the position of early childhood and carried into later life unless consciously changed.

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* From Harris, T.A., I'm OK -- You're OK: A Practical Guide to Transactional Analysis, Harper & Row, 1969

WHAT MUST CHANGE?

Efficiency vs. Effectiveness

Standards vs. Improvement

Control vs. Expectations

Cost vs. Contribution

Wage vs. Salary and Sharing Gains

Automation vs. Integration

Stability vs. Flexibility

Training vs. Learning / Teaching

Symptoms vs. Problems

Customs vs. Opportunities

Direction vs. Support

COPING WITH AMBIGUITY

Rick Roskin

Budner (1961) defined an ambiguous situation as one that cannot be categorized because significant cues are missing. He identified three types of ambiguous situations: (1) *novel*—a completely new situation with cues of uncertain utility; (2) *complex*—a situation with too many cues; and (3) *insolvable*—a situation with contradictory cues.

Much has been written on intolerance for ambiguity (Frenkel-Brunswick, 1949), the tendency to shut out conflicting elements in the environment, use rigid differentiation, and seek premature closure (i.e., make decisions before collecting all available information). Tolerance of ambiguity has been found to be dependent on *capacity*, the innate ability to perceive the complexity of a situation, and *opportunity*, the variety of experiences encountered by an individual.

All managers must cope with ambiguous situations, whether they deal with meeting abstract or concrete objectives; the amount of ambiguity increases as managers move into higher level positions simply because their positions are defined less clearly, their decisions must relate to long-term goals, their perspectives must be broader, and feedback on their performance is less frequent and less specific.

It can be argued that the higher one's job level, the more tolerant one must be of ambiguity. Lower level managers, because their tasks are often more structured, can afford to be less tolerant of ambiguity. This issue was researched by Graves (1966), who argued that some individuals may remain at certain behavioral levels through their working lives. According to Graves, if an employee's level is significantly different from his or her manager's, a deterioration of work standards will result. Therefore, managers must be sensitive to differences and flexible in ambiguous circumstances.

Most people cope with ambiguity by either *avoiding* it (i.e., denying or ignoring it) or by *absorbing* it (i.e., accepting it and managing it). Either method may be effective, depending on the circumstances. *Avoidance* can help keep the routines in place, allow planning, delegation, and the continued best use of technology and resources. It can also lead to perceptual distortion, insensitivity, indecision, and construction of elaborate defense mechanisms. *Absorption* can help managers acquire personal skill in problem solving, allow them the experience of working through new problems and can lead to innovative solutions. Unskilled managers can also make errors through ignorance and incompetence.

RATIONALE FOR THE QUESTIONNAIRE

The Managerial Attitude Questionnaire was designed to tap individual propensity to cope with ambiguity either by seeking closure or by seeking a broad range of alternatives. Those taking the questionnaire are asked to distribute one hundred points over six responses for each of ten situations. A logarithmic transformation is then used to categorize individuals as having high, medium, or low tolerance for ambiguity (Shannon, 1948). The greater the number of categories over which points are distributed, the higher the assumed tolerance. The lower scores may indicate too low a tolerance for ambiguity or singlemindedness, while a high score may indicate a manager without clear direction, one who accepts too much ambiguity.

One bit of data that tends to support such interpretations is that the obtained correlation between scores on the Rokeach Dogmatism Scale (1960) and scores on the Managerial Attitude Questionnaire is -.36 in a sample of thirty working adults. This finding indicates that those persons who are more tolerant of ambiguity are less dogmatic in their personal belief system, which is as one would predict.

USES FOR THE QUESTIONNAIRE

Participants may be asked to discuss the ten incidents and the weight they assigned to the various alternatives. This can prove interesting and show those who tend to discriminate the most and the least. Comparisons between groups of students and groups of managers can be made. The following means were computed for business administration students and working adults.

Incident	1	2	3	4	5	6	7	8	9	10	$\overline{X}$
Students N = 90	87	97	89	82	99	88	73	87	101	99	90.2
Adults N = 40	69	70	90	57	86	83	74	65	78	83	75.5
Working Adults N = 30	78	81	78	57	86	61	67	68	90	88	75.3
SD	23	29	26	30	19	41	30	27	22	31	16.55

	Low	*Medium*	*High*
Students	0-84	85-99	100-156
Managers	0-65	66-95	96-156

The mean for students is generally about 90 while that for working managers is about 75. This leads to the question of whether experience may result in tunnel vision or may allow people to reject unsound alternatives more easily. Discussions of such questions are fruitful and very useful in management-training groups. Results from the questionnaire can also be used to help match individual styles of dealing with ambiguity to the proper job niche.

ADMINISTRATION

The Managerial Attitude Questionnaire is self-administered and self-scoring. It should be completed and scored by most persons in 30-40 minutes.

The interpretation sheet can be directly distributed to the participants after scoring or it can serve as the basis of a lecturette and discussion session following the completion of the instrument.

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MANAGERIAL ATTITUDE QUESTIONNAIRE

Rick Roskin

Name: ______________________________

Employer: ______________________________

Position with Company: ______________________________

Number of People You Supervise: ______________________________

Length of Time in Present Position: ______________________________

Formal Management Training: ______________________________

____

Instructions: For each incident below, indicate your degree of approval for each of the interpretations by assigning any number of points from 0 to 100 to any of the interpretations. Total points assigned *must* equal 100. Assign a number to each interpretation, even if that number is 0.

Sample Item

A. A supervisor responsible to you has been absent from work too many times. After you have given him many reprimands, you find him solving a crossword puzzle in his office when he should be attending to duties.

Would you:

a. __0__ Fire him in almost all cases
b. __40__ Reprimand him but not fire him
c. __0__ Overlook the situation
d. __40__ Ask him for an explanation
e. __20__ Lay him off where regulations allow
f. __0__ Not fire him in almost all cases
100

1. You are a supervisor for a small group of workers. Unfortunately, your philosophy and th company's philosophy conflict and your influence with upper management is limite Your group is dissatisfied with company policy.

Would you ask employees:

a. ____ To fall in line in almost all cases
b. ____ To make up their own minds
c. ____ To follow the majority decision of all members
d. ____ To follow your position on issues
e. ____ To communicate their concern to management
f. ____ Not to fall in line in almost all cases

2. A group of employees under you develops an improved tool capable of increasin productivity by 50 percent. Actual productivity increases 10 percent and quality improves a well. The group withholds information about the tool from the methods engineer.

Would you:

a. ____ Tell the methods engineer in almost all cases
b. ____ Attempt to convince the employees to divulge the information
c. ____ Be satisfied with the 10 percent increase
d. ____ Speak to each worker individually to assesss the situation
e. ____ Ask the workers to increase their output
f. ____ Not tell the methods engineer in almost all cases

3. You are a supervisor in the production department of your firm. The firm has stringen regulations against the consumption of alcohol on business premises. One hot afternoo you find an "old timer" drinking a bottle of beer.

Would you:

a. ____ Report the person in almost all cases
b. ____ Reprimand the person and give a warning
c. ____ Ask for an explanation of this behavior
d. ____ Lay off the person as allowed in the union contract
e. ____ Overlook the incident after making certain that the person sees you
f. ____ Not report the person in almost all cases

4. You find out that a shipper has been "working a deal" with the majority of your best salespeople whereby they all gain financially at the expense of the organization. The amounts are not large but the practice is widespread. You are the sales manager.

   Would you:

   a. ____ Fire all the guilty parties in almost all cases
   b. ____ Fire the shipper and keep the salespeople
   c. ____ Call a meeting to tell them you know what they are doing but not fire anyone
   d. ____ Overlook the situation, assuming it to be a "bonus"
   e. ____ Try to catch them in the act
   f. ____ Not fire all guilty parties in almost all cases

5. Due to rapid expansion of your organization, your "open door" policy is taking up a disproportionate amount of time.

   Would you:

   a. ____ "Close the door" in almost all cases
   b. ____ Try to have your secretary screen employees before they reach you
   c. ____ Institute a formal communication system such as a company newsletter
   d. ____ Work after hours so as to maintain your close relationship with employees
   e. ____ Set up an appointment book
   f. ____ Not close the door in almost all cases

6. A new production process will increase profits by an estimated 10 percent. It will also significantly pollute a large river running through a nearby town. Government regulations do not affect your firm.

   Would you:

   a. ____ Introduce the process in almost all cases
   b. ____ Introduce the process only if profits are lower than usual
   c. ____ Introduce the process only if your competitor does
   d. ____ Not introduce the process unless pressured by upper management
   e. ____ Not introduce the process if residents of the town complain
   f. ____ Not introduce the process in almost all cases

7. A friend is having difficulty at work with subordinates. Informally you have heard it said that your friend is too autocratic and disorganized. The friend has asked you for your opinion of why problems exist.

   Would you:

   a. ____ Tell your friend what you have heard in almost all cases
   b. ____ Tell your friend that he or she is too autocratic but not discuss organizational ability
   c. ____ Tell your friend that he or she is disorganized but not discuss his or her autocratic behavior
   d. ____ Tell your friend that what he or she does at work is his or her own business
   e. ____ Ask your friend what he or she thinks the problem is
   f. ____ Not tell your friend what you have heard in almost all cases

8. As manager of a radio station, you are faced with a dilemma. Your program manager works a twelve-hour day, but the popularity of the station is declining and it is losing money. The program manager has worked for your organization for five years.

   Would you:

   a. ____ Fire the program manager in almost all cases
   b. ____ Replace the person and give him or her another job
   c. ____ Take over some of the program manager's duties yourself
   d. ____ Ask the person to look for another job but continue to employ him or her
   e. ____ Try to determine the person's weaknesses so that you can help
   f. ____ Not fire the program manager in almost all cases

9. Your best salesperson has difficulty relating to peers. The position of sales manager is open and this salesperson has told you that he/she plans to leave if not promoted.

   Would you:

   a. ____ Give the person the job in almost all cases
   b. ____ Tell the person that he or she needs more management training
   c. ____ Tell the person that you hate to lose a great salesperson to gain a questionable sales manager
   d. ____ Ask the person what qualities he or she has to do a good job
   e. ____ Tell the person to prove that he or she can get along with others first
   f. ____ Not give the person the job in almost all cases

10. A bright young scientist has joined your research team in the past few months. The scientist has come to you with a letter from a competing firm offering a job with a 25 percent salary increase.

Would you:

a. ____ Offer an equal salary in almost all cases

b. ____ Ask why he or she is showing you the letter

c. ____ Try to sell the advantages of your firm

d. ____ Tell the scientist that he or she can make as much at your firm after a time

e. ____ Tell the person that loyalty should count for something

f. ____ Not offer to increase salary in almost all cases

MANAGERIAL ATTITUDE QUESTIONNAIRE SCORING SHEET

Transfer your raw scores from the questionnaire to the grid below by placing your a, b, c, d, e, and f raw scores for each incident in the appropriate box in Column S. Using the Conversion Table at the bottom of the page, convert each raw score in Column S into an AS converted score and enter the converted score in Column AS.

- Total the AS columns vertically.
- Total all the AS sums horizontally.
- Divide the total by 10, the number of incidents.
- Note whether your score falls within the low (L), medium (M), or high (H) range. (Round up if .5 or over.)

	1		2		3		4		5		6		7		8		9		10	
	S	AS	S	AS	S	AS	S	AS	S	AS	S	AS	S	AS	S	AS	S	AS	S	AS
a																				
b																				
c																				
d																				
e																				
f																				
Totals			+		+		+		+		+		+		+		+		+	

÷10 = ____ **Total Score**

Conversion Table

Score	0	2	4-6	7-11	12-20	21-30	31-40	41-60	61-80	81-90	91-100
AS	1	7	13	19	26	30	32	29	21	7	0

Total Score

	Low	M	High
Range	0 / 75	76 / 95	96 / 156

MANAGERIAL ATTITUDE QUESTIONNAIRE INTERPRETATION SHEET

Low Scores (0-75) indicate a self-reported intolerance for ambiguity. Despite complex or contradictory cues, you say you are able to make clear-cut, unambiguous decisions. Those with this style often appear to be able to "cut through the smoke" and recommend a clear-cut course of action where others are unwilling to move. One of the disadvantages of this style is that you may appear to be precipitous and perhaps even bullheaded.

Medium Scores (75-95) indicate a self-reported moderate tolerance for ambiguity. When the cues in a situation are complex or contradictory, you try to sort them out and narrow the alternatives so that you have identified feasible courses of action. One of the advantages of this style is that you may be seen as a sensitive, understanding person who can see many sides of the problem. One of the disadvantages of this style is that you may be seen as opportunistic or self-serving.

High Scores (96-156) indicate a self-reported high tolerance for ambiguity. You will find it easy to postpone a decision when the cues for decision making are ambiguous or not clear cut. One of the advantages of this style is that you may often appear wise and unwilling to rush into complex or novel situations. One of the disadvantages of this style is that you may appear "wishy washy" and indecisive, surrendering your power to others.

Some interpretative questions to be considered:

- How congruent is your score with your self-perception of your tolerance of ambiguity? This can also be checked with colleagues and associates.
- How congruent is your score with the level of tolerance of ambiguity required at your present level of management?
- What are the possible limitations, if any, of your present level of tolerance of ambiguity on your advancement to higher levels of management?

INTRODUCTION TO THE LECTURETTES SECTION

Lecturettes are brief, focused concept papers that summarize specific topics relevant to facilitators, trainers, and consultants. They are not designed to cover broad topical areas or to serve as in-depth background for professional development but are to be used to prepare verbal presentations that introduce or conclude a structured learning experience or as handouts for participants.

One frequent theme of lecturettes has been the nature of the small group, its processes, and its development. It may be timely to review briefly the major models of group development to provide a context for understanding their thematic relationships. Hill (1973) offered one extensive categorization of small-group activity, centered on the now-common distinction between the *content* or topic of work or discussion and the *process* or interaction dynamics that determine how the content is dealt with. This basic distinction is not at all new, going back at least as far as the classic work of Benne and Sheats (1948). (Also see Nylen, Mitchell, & Stout, 1976.) Hill, however, focused on particular categories of content: dealing with a topic; discussing the operation of the group itself; talking about an individual group member—his or her task activities or behaviors relating to the group's process; and examining relationships between group members. The latter two categories may or may not be especially relevant to a particular group. That is, the real focus may be on the individual, in terms of personal growth, or on interpersonal relationships in general. When a particular topic is the center of group attention, the group usually is engaged in task activity. When individuals or relationships are the focus, we usually would label the group a "personal growth group" because the center of activity is the examination of individual and interpersonal behaviors. When the group itself is the focus, we typically say that the group is working on examining and improving its own processes. Hill (1973) also suggested that any of the four content categories could be dealt with by means of more or less direct processes, ranging from highly confrontive (most direct) to merely responsive (least direct). Hill's model not only helped to categorize group activity, but also helped to explain the dynamics of groups.

One of the early attempts to identify critical dynamic processes was Schutz's (1958) work, which resulted in a typology of three primary processes that are characteristics of individuals but are "played out" in groups: the need for inclusion, the need for control, and the need for affection [now openness]. Since his formulation of this theory, Schutz and others have conducted many studies supporting this theoretical approach. Later, Schutz (1967) developed a sequential model of how groups first must deal with inclusion issues, then with control concerns, and finally with affection (or openness). Despite this added emphasis on dynamics, Schutz's model was primarily focused on personal growth and relationship issues, as defined by Hill, rather than on the group's tasks. Smith (1977) expanded Schutz's approach by making explicit some dimensions of the intragroup communication process.

Bion (1960) divided group activity into two categories: dealing with "basic assumptions" and work on the task. Bion postulated three basic assumptions similar to Schutz's: (1) dependency, (2) fight or flight, and (3) pairing. (These were described in somewhat more detail by Thoresen, 1972.) Bion saw the group as moving between dealing with basic assumptions and

"Leadership Development"

Look at the words at both ends of the line before you put in your "X." Please remember that there are no right or wrong answers. Work rapidly; your first answer is likely to be the best. Please do not omit any items, and mark each item only once.

Least Preferred Person - (LPP)

Think of the person with whom you can work least well. He may be someone you work with now, or he may be someone you knew in the past.

He does not have to be the person you like least well, but should be the person with whom you had the most difficulty in getting a job done. Describe this person as he appears to you.

1. Pleasant :___:___:___:___:___:___:___:___: Unpleasant
   8 7 6 5 4 3 2 1
2. Friendly :___:___:___:___:___:___:___:___: Unfriendly
   8 7 6 5 4 3 2 1
3. Rejecting :___:___:___:___:___:___:___:___: Accepting
   1 2 3 4 5 6 7 8
4. Helpful :___:___:___:___:___:___:___:___: Frustrating
   8 7 6 5 4 3 2 1
5. Unenthusiastic :___:___:___:___:___:___:___:___: Enthusiastic
   1 2 3 4 5 6 7 8
6. Tense :___:___:___:___:___:___:___:___: Relaxed
   1 2 3 4 5 6 7 8
7. Distant :___:___:___:___:___:___:___:___: Close
   1 2 3 4 5 6 7 8
8. Cold :___:___:___:___:___:___:___:___: Warm
   1 2 3 4 5 6 7 8
9. Cooperative :___:___:___:___:___:___:___:___: Uncooperative
   8 7 6 5 4 3 2 1
10. Supportive :___:___:___:___:___:___:___:___: Hostile
    8 7 6 5 4 3 2 1
11. Boring :___:___:___:___:___:___:___:___: Interesting
    1 2 3 4 5 6 7 8
12. Quarrelsome :___:___:___:___:___:___:___:___: Harmonious
    1 2 3 4 5 6 7 8
13. Self-assured :___:___:___:___:___:___:___:___: Hesitant
    8 7 6 5 4 3 2 1
14. Effient :___:___:___:___:___:___:___:___: Inefficient
    8 7 6 5 4 3 2 1
15. Gloomy :___:___:___:___:___:___:___:___: Cheerful
    1 2 3 4 5 6 7 8
16. Open :___:___:___:___:___:___:___:___: Guarded
    8 7 6 5 4 3 2 1

SOURCE: A THEORY OF LEADERSHIP EFFECTIVENESS, Fred E. Fiedler, McGraw-Hill Book Company, 1967.

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"Leadership Development"

Look at the words at both ends of the line before you put in your "X." Please remember that there are no right or wrong answers. Work rapidly; your first answer is likely to be the best. Please do not omit any items, and mark each item only once.

Most Preferred Person - (MPP)

Think of the person with whom you can work best. He may be someone you work with now, or he may be someone you knew in the past.

He does not have to be the person you like best, but should be the person with whom you had the best results in getting a job done. Describe this person as he appears to you.

1.	Pleasant	8	7	6	5	4	3	2	1	Unpleasant
2.	Friendly	8	7	6	5	4	3	2	1	Unfriendly
3.	Rejecting	1	2	3	4	5	6	7	8	Accepting
4.	Helpful	8	7	6	5	4	3	2	1	Frustrating
5.	Unenthusiastic	1	2	3	4	5	6	7	8	Enthusiastic
6.	Tense	1	2	3	4	5	6	7	8	Relaxed
7.	Distant	1	2	3	4	5	6	7	8	Close
8.	Cold	1	2	3	4	5	6	7	8	Warm
9.	Cooperative	8	7	6	5	4	3	2	1	Uncooperative
10.	Supportive	8	7	6	5	4	3	2	1	Hostile
11.	Boring	1	2	3	4	5	6	7	8	Interesting
12.	Quarrelsome	1	2	3	4	5	6	7	8	Harmonious
13.	Self-assured	8	7	6	5	4	3	2	1	Hesitant
14.	Efficient	8	7	6	5	4	3	2	1	Inefficient
15.	Gloomy	1	2	3	4	5	6	9	8	Cheerful
16.	Open	8	7	6	5	4	3	2	1	Guarded

SOURCE: A THEORY OF LEADERSHIP EFFECTIVENESS, Fred E. Fiedler, McGraw-Hill Book Company, 1967.

SCORE SHEET

MPP - LPP

	MPP Scores	LPP Scores	Difference	D☐
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				

Sum of Squares______________

Square Root of Sum______________

Subtract Large number from small one.
Square the difference (4x4 = 16).
Add the squared numbers.
Extract square root of sum.

SQUARE ROOT TABLE

Number	Square Root	Number	Square Root
10	3.1	400	20.0
20	4.5	10	20.2
30	5.4	20	20.4
40	6.3	30	20.7
50	7.1	40	20.9
60	7.7	50	21.2
70	8.3	60	21.4
80	8.9	70	21.6
90	9.4	80	21.9
100	10.0	90	22.1
10	10.4	500	22.3
20	10.9	10	22.5
30	11.4	20	22.8
40	11.8	30	23.0
50	12.2	40	23.2
60	12.6	50	23.4
70	13.0	60	23.6
80	13.4	70	23.8
90	13.7	80	24.0
200	14.1	90	24.2
10	14.4	600	24.4
20	14.8	10	24.6
30	15.1	20	24.8
40	15.4	30	25.0
50	15.8	40	25.2
60	16.1	50	25.4
70	16.4	60	25.6
80	16.7	70	25.8
90	17.0	80	26.0
300	17.3	90	26.2
10	17.6	700	26.4
20	17.8	10	26.6
30	18.1	20	26.8
40	18.4	30	27.0
50	18.7	40	27.2
60	18.9	50	27.4
70	19.2	60	27.6
80	19.4	70	27.7
90	19.7	80	27.9
		90	28.0
		800	28.2

PERSONAL STYLE INVENTORY

R. Craig Hogan and David W. Champagne

Just as every person has differently shaped feet and toes from every other person, so we all have differently "shaped" personalities. Just as no person's foot shape is "right" or "wrong," so no person's personality shape is right or wrong. The purpose of this inventory is to give you a picture of the shape of your preferences, but that shape, while different from the shapes of other persons' personalities, has nothing to do with mental health or mental problems.

The following items are arranged in pairs (a and b), and each member of the pair represents a preference you may or may not hold. Rate your preference for each item by giving it a score of 0 to 5 (0 meaning you *really* feel negative about it or strongly about the other member of the pair, 5 meaning you *strongly* prefer it or do not prefer the other member of the pair). The scores for a and b MUST ADD UP TO 5 (0 and 5, 1 and 4, 2 and 3, etc.). *Do not use fractions such as 2½.*

I prefer:

1a. ____ making decisions after finding out what others think.
1b. ____ making decisions without consulting others.

2a. ____ being called imaginative or intuitive.
2b. ____ being called factual and accurate.

3a. ____ making decisions about people in organizations based on available data and systematic analysis of situations.
3b. ____ making decisions about people in organizations based on empathy, feelings, and understanding of their needs and values.

4a. ____ allowing commitments to occur if others want to make them.
4b. ____ pushing for definite commitments to ensure that they are made.

5a. ____ quiet, thoughtful time alone.
5b. ____ active, energetic time with people.

6a. ____ using methods I know well that are effective to get the job done.
6b. ____ trying to think of new methods of doing tasks when confronted with them.

7a. ____ drawing conclusions based on unemotional logic and careful step-by-step analysis.
7b. ____ drawing conclusions based on what I feel and believe about life and people from past experiences.

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8a. ____ avoiding making deadlines.
8b. ____ setting a schedule and sticking to it.

9a. ____ talking awhile and then thinking to myself about the subject.
9b. ____ talking freely for an extended period and thinking to myself at a later time.

10a. ____ thinking about possibilities.
10b. ____ dealing with actualities.

11a. ____ being thought of as a thinking person.
11b. ____ being thought of as a feeling person.

12a. ____ considering every possible angle for a long time before and after making a decision.
12b. ____ getting the information I need, considering it for a while, and then making a fairly quick, firm decision.

13a. ____ inner thoughts and feelings others cannot see.
13b. ____ activities and occurrences in which others join.

14a. ____ the abstract or theoretical.
14b. ____ the concrete or real.

15a. ____ helping others explore their feelings.
15b. ____ helping others make logical decisions.

16a. ____ change and keeping options open.
16b. ____ predictability and knowing in advance.

17a. ____ communicating little of my inner thinking and feelings.
17b. ____ communicating freely my inner thinking and feelings.

18a. ____ possible views of the whole.
18b. ____ the factual details available.

19a. ____ using common sense and conviction to make decisions.
19b. ____ using data, analysis, and reason to make decisions.

20a. ____ planning ahead based on projections.
20b. ____ planning as necessities arise, just before carrying out the plans.

21a. ____ meeting new people.
21b. ____ being alone or with one person I know well.

22a. ____ ideas.
22b. ____ facts.

23a convictions
23b verifiable conclusions.

24a keeping appointments and notes about commitments in notebooks or in appointment books as much as possible.
24b using appointment books and notebooks as minimally as possible (although I may use them)

25a discussing a new, unconsidered issue at length in a group.
25b puzzling out issues in my mind, then sharing the results with another person.

26a ____ carrying out carefully laid, detailed plans with precision.
26b ____ designing plans and structures without necessarily carrying them out.

27a logical people
27b feeling people.

28a being free to do things on the spur of the moment.
28b knowing well in advance what I am expected to do.

29a being the center of attention.
29b being reserved.

30a imagining the nonexistent.
30b ____ examining details of the actual.

31a ____ experiencing emotional situations, discussions, movies.
31b ____ using my ability to analyze situations.

32a ____ starting meetings at a prearranged time.
32b starting meetings when all are comfortable or ready.

PERSONAL STYLE INVENTORY SCORING SHEET

Instructions: Transfer your scores for each item of each pair to the appropriate blanks. careful to check the a and b letters to be sure you are recording scores in the right bla spaces. Then total the scores for each dimension.

Dimension		Dimension	
I	**E**	**N**	**S**
Item	*Item*	*Item*	*Item*
1b. ____	1a. ____	2a. ____	2b. ____
5a. ____	5b. ____	6b. ____	6a. ____
9a. ____	9b. ____	10a. ____	10b. ____
13a. ____	13b. ____	14a. ____	14b. ____
17a. ____	17b. ____	18a. ____	18b. ____
21b. ____	21a. ____	22a. ____	22b. ____
25b. ____	25a. ____	26b. ____	26a. ____
29b. ____	29a. ____	30a. ____	30b. ____
Total I ____	Total E ____	Total N ____	Total S ____

Dimension		Dimension	
T	**F**	**P**	**J**
Item	*Item*	*Item*	*Item*
3a. ____	3b. ____	4a. ____	4b. ____
7a. ____	7b. ____	8a. ____	8b. ____
11a. ____	11b. ____	12a. ____	12b. ____
15b. ____	15a. ____	16a. ____	16b. ____
19b. ____	19a. ____	20b. ____	20a. ____
23b. ____	23a. ____	24b. ____	24a. ____
27a. ____	27b. ____	28a. ____	28b. ____
31b. ____	31a. ____	32b. ____	32a. ____
Total T ____	Total F ____	Total P ____	Total J ____

PERSONAL STYLE INVENTORY INTERPRETATION SHEET

Letters on the score sheet stand for

I — introversion
E — extroversion
N — intuition
S — sensing
T — thinking
F — feeling
P — perceiving
J — judging

If your score is	the likely interpretation is
20-21	balance in the strengths of the dimensions
22-24	some strength in the dimension, some weakness in the other member of the pair
25-29	definite strength in the dimension; definite weakness in the other member of the pair
30-40	considerable strength in the dimension, considerable weakness in the other member of the pair

Your typology is those four dimensions for which you had scores of 22 or more, although the relative strengths of all the dimensions actually constitute your typology. Scores of 20 or 21 show relative balance in a pair so that either member could be part of the typology.

DIMENSIONS OF THE TYPOLOGY

The following four pairs of dimensions are present to some degree in all people. It is the extremes that are described here. The strength of a dimension is indicated by the score for that dimension and will determine how closely the strengths and weaknesses described fit the participant's personality.

Introversion—Extroversion

Persons more introverted than extroverted tend to make decisions somewhat independently of constraints and prodding from the situation, culture, people, or things around them. They are quiet, diligent at working alone, and socially reserved. They may dislike being interrupted while working and may tend to forget names and faces.

Extroverted persons are attuned to the culture, people, and things around them, endeavoring to make decisions congruent with demands and expectations. The extrovert is outgoing, socially free, interested in variety and in working with people. The extrovert may become impatient with long, slow tasks and does not mind being interrupted by people.

Intuition—Sensing

The intuitive person prefers possibilities, theories, gestalts, the overall, invention, and the new and becomes bored with nitty-gritty details, the concrete and actual, and facts unrelated to concepts. The intuitive person thinks and discusses in spontaneous leaps of intuition that may leave out or neglect details. Problem solving comes easily for this individual, although there may be a tendency to make errors of fact.

The sensing type prefers the concrete, real, factual, structured, tangible here-and-now, becoming impatient with theory and the abstract, mistrusting intuition. The sensing type thinks in careful, detail-by-detail accuracy, remembering real facts, making few errors of fact, but possibly missing a conception of the overall.

Feeling—Thinking

The feeler makes judgments about life, people, occurrences, and things based on empathy, warmth, and personal values. As a consequence, feelers are more interested in people and feelings than in impersonal logic, analysis, and things, and in conciliation and harmony more than in being on top or achieving impersonal goals. The feeler gets along well with people in general.

The thinker makes judgments about life, people, occurrences, and things based on logic, analysis, and evidence, avoiding the irrationality of making decisions based on feelings and values. As a result, the thinker is more interested in logic, analysis, and verifiable conclusions than in empathy, values, and personal warmth. The thinker may step on others' feelings and needs without realizing it, neglecting to take into consideration the values of others.

Perceiving—Judging

The perceiver is a gatherer, always wanting to know more before deciding, holding off decisions and judgments. As a consequence, the perceiver is open, flexible, adaptive, nonjudgmental, able to see and appreciate all sides of issues, always welcoming new perspectives and new information about issues. However, perceivers are also difficult to pin down and may be indecisive and noncommittal, becoming involved in so many tasks that do not reach closure that they may become frustrated at times. Even when they finish tasks, perceivers will tend to look back at them and wonder whether they are satisfactory or could have been done another way. The perceiver wishes to roll with life rather than change it.

The judger is decisive, firm, and sure, setting goals and sticking to them. The judger wants to close books, make decisions, and get on to the next project. When a project does not yet have closure, judgers will leave it behind and go on to new tasks and not look back.

STRENGTHS AND WEAKNESSES OF THE TYPES

Each person has strengths and weaknesses as a result of these dimensions. Committees and organizations with a preponderance of one type will have the same strengths and weaknesses.

Possible Strengths	**Possible Weaknesses**
Introvert	
independent	misunderstands the external
works alone	avoids others
is diligent	is secretive
reflects	loses opportunities to act
works with ideas	is misunderstood by others
is careful of generalizations	needs quiet to work
is careful before acting	dislikes being interrupted

Extrovert

understands the external	has less independence
interacts with others	does not work without people
is open	needs change, variety
acts, does	is impulsive
is well understood	is impatient with routine

Intuitor

sees possibilities	is inattentive to detail, precision
sees gestalts	is inattentive to the actual and practical
imagines, intuits	is impatient with the tedious
works out new ideas	leaves things out in leaps of logic
works with the complicated	loses sight of the here-and-now
solves novel problems	jumps to conclusions

Senser

attends to detail	does not see possibilities
is practical	loses the overall in details
has memory for detail, fact	mistrusts intuition
works with tedious detail	does not work out the new
is patient	is frustrated with the complicated
is careful, systematic	prefers not to imagine future

Feeler

considers others' feelings	is not guided by logic
understands needs, values	is not objective
is interested in conciliation	is less organized
demonstrates feeling	is uncritical, overly accepting
persuades, arouses	bases justice on feelings

Thinker

is logical, analytical	does not notice people's feelings
is objective	misunderstands others' values
is organized	is uninterested in conciliation
has critical ability	does not show feelings
is just	shows less mercy
stands firm	is uninterested in persuading

Perceiver

compromises	is indecisive
sees all sides of issues	does not plan
is flexible, adaptable	has no order
remains open for changes	does not control circumstances
decides based on all data	is easily distracted from tasks
is not judgmental	does not finish projects

Judger

decides	is unyielding, stubborn
plans	is inflexible, unadaptable
orders	decides with insufficient data
controls	is judgmental
makes quick decisions	is controlled by task or plans
remains with a task	wishes not to interrupt work

GENERALIZATIONS

The following generalizations can be helpful in applying this inventory to individual settings.

1. People who have the same strengths in the dimensions will seem to "click," to arrive at decisions more quickly, to be on the same wave length. Their decisions, however, may suffer because of their weaknesses, exhibiting blind spots and holes that correspond to the list of weaknesses for that type.

2. People who have different strengths in the dimensions will not see eye-to-eye on many things and will have difficulty accepting some views, opinions, and actions of the other. The more dimensions in which the two differ, the greater the conflict and misunderstanding of each other. However, decisions resulting from their interaction will benefit from the differing points of view and strengths of each.

3. People may be sensitive about criticisms in their areas of weakness and likely will prefer not to use these dimensions. As a result, conflict may occur when they must do so or when others point out deficiencies in these areas.

4. People will normally gravitate toward others who have similar strengths and weaknesses, although people of differing types are often drawn to one another because the strengths of one are admired and needed by the other.

5. People's values, beliefs, decisions, and actions will be profoundly influenced by all four of the stronger dimensions in their typology.

6. While a person's typology cannot be changed to its opposite, each person can learn to strengthen the weaker dimensions to some extent and to develop personal life strategies to overcome problems that result from the weaknesses.

•

IMPLICATIONS

The Personal Style Inventory raises several implications to consider.

1. Individuals, groups, and organizations with a preponderance of members whose strengths are in one type should seek out and listen to people of the opposite types when making decisions. Task-oriented groups would often benefit from a mixture of types.

2. People should realize that many differences in beliefs, values, and actions are the result of differences in style rather than of being right or wrong. Rather than be concerned over the differences, we need to understand and accept them and value the perspective they give.

3. When people must, of necessity, interact often with the same people (in teaching, business, marriage, etc.), interactions can be more congenial, satisfying, and productive if those involved, especially those with the greater power, understand the needs of others based on typology differences and adjust to them.

4. When interacting to accomplish tasks, people should be careful to label their values as values and then proceed to examine the facts and forces involved without defending the value position.

10 COMMANDMENTS OF LISTENING
DR. ED FLOVAK

1. DEVELOP AND INCREASE YOUR DESIRE TO LISTEN
2. STOP TALKING
3. BEHAVE LIKE A LISTENER
4. LISTEN TO UNDERSTAND
5. STRIVE TO HEAR AND UNDERSTAND THE MAIN POINTS
6. ISOLATE YOUR EMOTIONS
7. ASK QUESTIONS
8. REACT TO IDEAS AND INFORMATIVE - NOT PEOPLE
9. CONTROL INTERNAL DEBATE
10. USE THE SPEAKING/THINKING INFORMATION TO YOUR ADVANTAGE

Quality Concept: The Quality Gurus

Materials

Copies of the "Guru Quiz" and pencils.

Arrangements

Participants will work individually.

Time

Approximately fifteen minutes.

Objective

To summarize the basic philosophies of the three leading figures in the TQM movement.

Mini-Lecture

Ask anyone who has known about TQM for at least an hour who its leading figures are and you will hear these names: Dr. W. Edwards Deming, Dr. Joseph M. Juran, and Philip Crosby. These three men are so well-recognized because of their contributions (lectures, books, videotapes, and consulting work) that they are known as "gurus."

You may have seen or heard several of the phrases on the Guru Quiz, which I am about to distribute. Your task is to match each phrase with the name of the guru who said it.

[Distribute quiz. Allow participants five minutes to complete it. Then provide the answers and briefly discuss the terms.]

Answers:

1. **Philip Crosby**
2. **Dr. W. Edwards Deming**
3. **Dr. Joseph Juran**
4. **Dr. W. Edwards Deming**
5. **Philip Crosby**
6. **Dr. Joseph Juran**
7. **Dr. W. Edwards Deming**
8. **Philip Crosby**
9. **Philip Crosby**
10. **Dr. Joseph Juran**

Guru Quiz

In each blank space below, write the name of the quality guru who is associated with the term to the right of the space. The three quality gurus are: Dr. W. Edwards Deming, Dr. Joseph M. Juran, and Philip B. Crosby.

1. ______________________________ Zero defects
2. ______________________________ System of Profound Knowledge
3. ______________________________ Fitness for use
4. ______________________________ Seven Deadly Diseases
5. ______________________________ Do it right the first time
6. ______________________________ Conformance to requirements
7. ______________________________ Plan-Do-Check-Act
8. ______________________________ FANATICS
9. ______________________________ The cost of quality
10. ______________________________ Ten Steps to Quality Improvement

Quality Concept: Advancing the Mission

Materials

Paper and pencils.

Arrangements

Participants will work individually.

Time

Approximately twenty minutes.

Objective

To help participants to identify the problems that the organization would benefit most from solving.

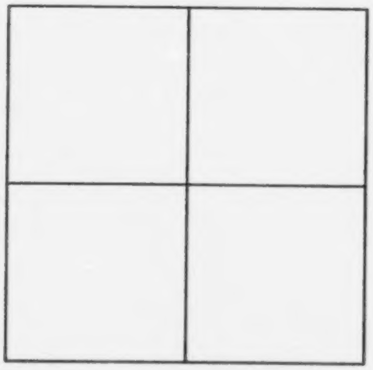
Mini-Lecture

Think about your own job. Roughly outline what you do in a typical day or a typical week. Now think about the problems that you encounter as you do your work—problems with colleagues, with the system, with equipment, with the environment, or with other sources of frustration, waste, or suboptimization. Make a list of all these problems. **[Allow at least five minutes for this. If two people are from the same office, encourage them to compare their lists.]**

Next, ask yourself what it would take to solve the problems to your satisfaction. Quickly record the idealized solution beside each problem.

Now fantasize a bit. Imagine that each of the problems you have listed has been solved as you believe it should be. Now analyze each problem solution in the following way: Place the letters "AM" beside those items that advance the mission of your organization. Then place the letters "PM" beside those problem solutions that would please you.

The last step is to draw a grid that looks like this but is at least four inches wide by four inches long:



The four quadrants should be labeled as follows:

+AM+PM (Advances the mission and pleases me)
+AM–PM (Advances the mission but doesn't please me)
–AM+PM (Pleases me but doesn't advance the mission)
–AM–PM (Doesn't advance the mission and doesn't please me)

Now place each problem from your original list inside whatever quadrant best suits that problem solution.

The items that wind up inside the +AM+PM quadrant are the ones that you should consider tackling on your own (or with your team members if they also are affected by the problem). Your job satisfaction will be greatly improved when you solve problems so that the organization's mission is being advanced *and* your needs are being met.

[You may wish to ask for volunteers to share some of their observations.]

Quality Concept: Discovering Creative Potential

Materials

Copies of "Creativity Self-Assessment" and pencils.

Arrangements

Participants will work individually.

Time

Approximately fifteen minutes; an additional twenty minutes if discussion is conducted.

Objectives

To encourage participants to engage in introspection; to develop creative potential.

Mini-Lecture

A top executive once asked Peter Drucker (1985), "the father of modern management science," what skills he should acquire in order to improve his managerial skills. To the executive's surprise, Drucker told him to learn how to play the violin!

At first glance, the answer may sound bizarre; music and business are unlikely bedfellows. Yet, solutions to problems in one realm often come from an entirely different field. Experts in the area of creativity tell us that the most innovative employees are those who have diverse interests, highly inquisitive natures, and receptivity to divergent or far-ranging viewpoints.

You will sharpen your problem-solving abilities if you work to see connections in diverse or nonaligned pieces of information. Whenever you can, work to engage in what Einstein described as "wildly speculative thinking." Take apparently incongruous threads of knowledge and weave them into a new "fabric" of solution.

Here is a "Creativity Self-Assessment" survey **[distribute handout].** A score of fifty or more indicates a high degree of creativity.

[When the participants have completed the survey, you may wish to conduct a discussion.]

Creativity Self-Assessment

This survey allows you to assess your own creativity quotient. Clearly, it is important for you to be honest in your responses. The activity will not provide any insight unless you approach it with an openness to discover the ways in which you may be blocking your creative potential.

In the blank to the left of each question, place the appropriate number:

1 = NEVER 2 = SELDOM 3 = OFTEN 4 = ALWAYS

1. _____ I am stimulated by complex problems and situations that call for serious thought.
2. _____ I search for new and better ways of doing my work.
3. _____ My colleagues regard me as a source of innovative ideas.
4. _____ I associate with people whose viewpoints differ distinctly from mine.
5. _____ I ask a lot of questions.
6. _____ My associates ask for my opinion on tough-to-solve problems.
7. _____ I look at things from a variety of perspectives.
8. _____ I do not worry about being different from others.
9. _____ I entertain new ideas with enthusiasm rather than with skepticism.
10. _____ Change excites me.
11. _____ I am impatient with rigid problem solvers.
12. _____ I read voraciously, both within and outside my field.
13. _____ I encourage open discussions and disagreements among my associates.
14. _____ Good ideas come to me in my sleep.
15. _____ I like to look at the usual in an unusual way.

Quality Concept: Quality Words

Materials

Paper, pencils, flip-chart paper, and marking pens.

Arrangements

Participants will work in pairs.

Time

Approximately twenty minutes.

Objective

To review terms associated with the Total Quality movement.

Mini-Lecture

In this activity, we will flex our mental muscles in reference to Quality terms. As a prelude to thinking about Quality words, let me ask you to think about the human anatomy. There are over thirty words (including abbreviations but excluding vulgarities) that refer in some way to the human body and that can be written with only three letters. An example is "eye."

[Elicit other words from the participants. Answers include arm, cut, ear, egg, fat, gum, gut, hip, jaw, lap, leg, lip, pit, pus, rib, sac, tip, toe, and zit.]

Find a partner now and see if you can come up with ten words—there are over thirty—that can be written with *four* letters (excluding vulgarities) and that refer in some way, however remote, to the human anatomy. You may *not* simply add "s" to the three-letter words!

[Elicit answers from participants. Answers include acne, back, bile, bone, brow, calf, cell, cord, corn, cyst, duct, face, feet, flab, foot, gene, germ, hair, hand, head, heel, iris, knee, lash, limb, lobe, lung, mole, nail, nape, neck, node, nose, pore, scar, shin, skin, sole, spit, tear, tube, ulna, vein, wart, and womb.]

Now we come to the hard part. In only five minutes, you and your partner are to list as many Quality-related words as you can. The words you write can have only seven *or* eight letters, such as the word "quality."

[Solicit words from the pairs and list them on flip-chart paper. Some possible answers are empower, optimize, teamwork, culture, supplier, customer, measure, satisfy, analysis, improve, training, fishbone, diagram, and mission. Clarify any terms that participants do not understand.]

Chapter 4

Getting Underway

"Toto, I've a feeling we're not in Kansas anymore!"

—Dorothy
Wizard of Oz

During your team's first few meetings, it is not at all unusual to feel as though you have been transported to the Land of Oz, a place completely different from what you are used to. Most project team members will be participating in an activity unlike any they've done before, perhaps working with people they've never worked with before, and using methods they've probably never used before.

Being less than elegant is understandable and commonplace. If you and your teammates feel self-conscious, awkward, inept, or overwhelmed after your first meetings, congratulate yourselves on being normal.

Rest assured that these early feelings of inadequacy have no relationship to your team's ultimate success. Some of the most successful project teams start out looking less like quality leaders and more like The Keystone Kops.

The techniques your team will be using really do work. You are not guinea pigs testing unproven approaches to improving quality and productivity. The problem-solving methods described in this book are superior to any currently available.

This is a new area of quality improvement. There is a lot for you to learn, and neither you nor your teammates can expect to be experts in all the knowledge and skills you will need. But each of you has something important to contribute: your experience and expertise. Whatever else you need to know, you can learn together.

Notes...

The initial team meetings are critical for setting a proper tone: there is serious work at hand, but everyone can have fun and contribute to the organization by working together. This requires a balance between studying the process and learning about each other. The following guidelines will help you develop productive meeting skills, and lead you through the first few meetings.

I. Guidelines for Productive Meetings

Though individual team members carry out assignments between team meetings, much of the team's work gets done when all team members are together—during meetings. Many people dislike meetings, but meetings don't have to be disliked. Like other processes, they can be studied and constantly improved. Productive meetings enhance the chance of having a successful project.

It is difficult to have productive meetings because few people know the rules and skills needed. In fact, the goal of having constantly improved meetings may be as hard for the team to reach as the improvement goals set for the project. The best way to have productive meetings is to follow the guidelines given below from the start of the project, a time when team members expect to learn new ways of working together.

General Rules

Through experience, we have learned how to conduct productive, orderly meetings. The basic rules are:

- **Use agendas**
  Each meeting must have an agenda, preferably one drafted at the previous meeting and developed in detail by one or two members prior to the actual meeting. It should be sent to participants in advance, if possible. (If an agenda has not been developed before a meeting, spend the first five or ten minutes writing one on a flipchart.)

  Agendas should include the following information:
  - § The agenda topics (including, perhaps, a sentence or two that defines each item and why it is being discussed).
  - § The presenters (usually the person who originated the item or the person most responsible or knowledgeable about it).
  - § A time guideline (the estimated time in minutes needed to discuss each item).
  - § The item type, and whether the item requires discussion or decision, or is just an announcement.

  Agendas usually list the following activities:
  - § Warm-ups: short (five to ten minute) activities used to free people's minds from the outside world and get them focused on the meeting. (See "Warm-Ups," p. 4-32.)
  - § A quick review of the agenda. Simply start each meeting by going over the agenda, adding or deleting items, and modifying time estimates.

General Meeting Rules

- **Use agendas**
- **Have a facilitator**
- **Take minutes**
- **Draft next agenda**
- **Evaluate the meeting**
- **Adhere to the "100-mile rule"**

- § Breaks for long meetings. If the meeting lasts more than two hours, schedule at least one short break.
- § Meeting evaluation. This is perhaps the most important item on the agenda. Details are later in the chapter.

Though some of these elements may be unfamiliar, we encourage team leaders to introduce them at the first meeting and include them in all subsequent meetings. Team members will probably feel awkward at the first meeting anyway, and a new activity will not add much to that awkwardness. As members become more comfortable with the group, they will feel less self-conscious about these activities. (Sample agendas appear on pp. 4-30 and 4-36.)

- **Have a facilitator**

Each meeting should have a facilitator who is responsible for keeping the meeting focused and moving. Ordinarily, this role is appropriate for the project team leader, but your team may rotate the responsibility among its members.

The facilitator's chief responsibilities are:

- § Keep the discussion focused on the topic and moving along;
- § Intervene if the discussion fragments into multiple conversations;
- § Tactfully prevent anyone from dominating or being overlooked;
- § Bring discussions to a close.

The facilitator should also notify the group when the time allotted for an agenda item has expired or is about to expire. The team then decides whether to continue discussion at the expense of other agenda items or postpone further discussion until another meeting.

- **Take minutes**
  Each meeting should also have a scribe who records key subjects and main points raised, decisions made (including who has agreed to do what and by when), and items that the group has agreed to raise again later in this meeting or at a future meeting. Team members can refer to the minutes to reconstruct discussions, remind themselves of decisions made or actions that need to be taken, or to see what happened at a meeting they missed. Rotate this duty among the team members.

- **Draft next agenda**
  At the end of the meeting, draft an agenda for the next meeting.

- **Evaluate the meeting**
  Always review and evaluate each meeting, even if other agenda items go overtime. The evaluation should include decisions on what will be done to improve the meeting next time and helpful feedback to the facilitator. You may want to experiment with mid-meeting evaluations.

- **Adhere to the "100-mile rule"**
  Once a meeting begins, everyone is expected to give it their full attention. No one should be called from the meeting unless it is so important that the disruption would occur even if the meeting was 100 miles away from the workplace. The "100-mile rule" will need to be communicated—perhaps repeatedly—to those who keep taking phone messages or would interrupt the team's work for other reasons.

Effective Discussion Skills

- Ask for clarification
- Act as gatekeepers
- Listen
- Summarize
- Contain digression
- Manage time
- End the discussion
- Test for consensus
- Constantly evaluate the meeting process

Effective Discussion Skills

Effective discussions are necessary for effective meetings, which in turn are necessary for effective teams. Every team meeting should include actions that facilitate the process of discussion. Clearly the team leader should use skills for effective discussion; the team will be even more successful if every team member learns and practices them. The following techniques are presented in the framework of team meetings, but they are useful whenever an effective discussion is important.

At appropriate times during a meeting, team members should:

- **Ask for clarification**
  If you are unclear about the topic being discussed or the logic in another person's arguments, ask someone to define the purpose, focus, or limits of the discussion. Ask members to repeat ideas in different ways. Ask for examples, pictures, diagrams, data, etc.

- **Act as gatekeepers**
  Encourage more-or-less equal participation among group members by "throttling" dominators. Make openings for less aggressive members by directly asking their opinions or making a general request for input.

- **Listen**
  Actively explore one another's ideas rather than debating or defending each idea that comes up.

- **Summarize**
  Occasionally compile what's been said and restate it to the group in summary form. Follow a summary with a question to check for agreement.

- **Contain digression**
  Do not permit overlong examples or irrelevant discussion.

- **Manage time**
  If portions of the agenda take longer than expected, remind the team of deadlines and time allotments so work can be either accelerated or postponed, or time rebudgeted appropriately.

- **End the discussion**
  Learn to tell when there is nothing to be gained from further discussion. Help the team close a discussion and decide the issue.

- **Test for consensus**
  Summarize the group's position on an issue, state the decision that seems to have been made, and check whether the team agrees with the summary. (See "What is Consensus," p. 2-40.)

- **Constantly evaluate the meeting process**
  Throughout the meeting assess the quality of the discussion. Ask: Are we getting what we want from this discussion? If not, what can we do differently in the remaining time?

Following these guidelines will help a team have effective discussions and productive meetings. But there is more that goes into the development of teams than learning to have good meetings. These needs are covered in depth in Chapter 6.

II. Setting Up Record-Keeping Systems

The final crucial element in having good meetings and a successful project is to maintain up-to-date files. Good project records are helpful for several compelling reasons:

- Projects often last 6 to 18 months or longer, so the team may lose or gain members. Good records help new members catch up and keep old members informed of developments.

- Clear, illustrated records help educate and win the support of people in the organization who may not have time to read or listen to lengthy reports.

- Frequently, presentations about a successful project are widely circulated within the company, the industry, or local businesses. Having up-to-date records makes it easier to prepare these presentations.

- As the project progresses, the team may have to retrace its steps to track down problems or errors. Good records make this easier.

For these reasons, document your team's work from the earliest stages. Talk about what kinds of records you are likely to need further down the road and plan how to maintain these records.

We recommend keeping a central file for documents, papers, correspondence, and other pertinent records. Organize the file around the agendas or a top-down flowchart of the improvement plan developed by the team. Hint: If you construct a flowchart (or other similar diagram) that depicts likely steps in your project, number or code each step and use that code in all files.

Two specific types of records that have proven particularly useful are meeting records and the picture book format.

Meeting Records

Keeping notes on decisions and problems discussed at each meeting prevents needless rehashing of issues. Agendas, minutes, and the action and the futures lists (see below, and right) are all included here.

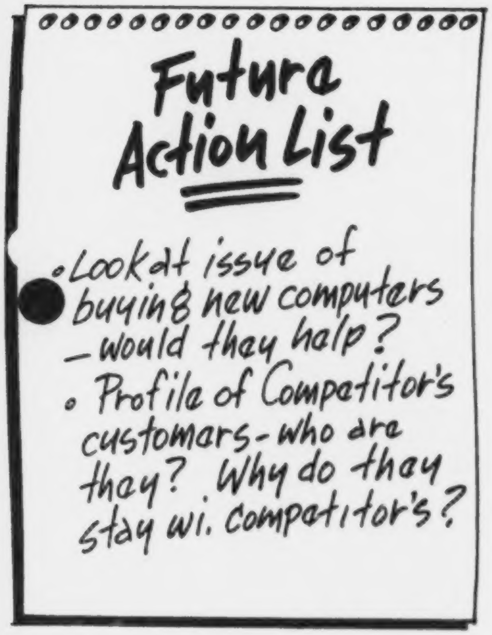
- **Agendas**

  The Model Agenda for Regular Meetings discussed in detail later in this chapter (pp. 4-35 to 4-38) incorporates several elements useful in documenting the project. First, the meeting date or number can be used to code all records (reports, handouts, data summaries) associated with that meeting. Secondly, it refers to two lists:

  § *Action List*: Keeps track of the "to do's" decided upon during this meeting, noting who has agreed to do what by when.

Action List

- Review previous reports on this subject
  -2 weeks/Juanita
- Prepare trial data collection sheet
  -Next week/Kim & Joe
- Draft operational definitions
  -Next week/Conrad, Joe & LaVon
- Be prepared to discuss Deming's 14 Points
  -2 weeks/Everyone!



Future Action List

- Look at issue of buying new computers - would they help?
- Profile of Competitor's customers - who are they? Why do they stay wi. competitor's?

§ *Futures List*: Keeps track of items for action or discussion that the team agrees are worthwhile but should be undertaken later. Putting items on this list means they won't be lost or forgotten, and can be resurrected at a future meeting.

Have the scribe or other designated person keep track of these lists at your meetings.

- **Project Team Meeting Minutes**

  The meeting minutes remind team members about points of discussion, tasks to be performed between meetings, decisions made, and responsibilities assigned. They also help managers, and others who receive copies, to understand the issues and challenges facing the project team. Because they are an historical record of the team's progress, minutes may provide useful information for future teams making further improvements to the same process.

  In order to fulfill these functions, meeting minutes should contain several types of information: date and time of meeting, names of those attending, topics discussed, procedures used for each topic, main points made in each discussion, action taken or decision made, tasks to be performed between meetings, and items to be carried over to future agendas. (The last two items can be broken out as the action list and futures list described above.)

- **Alternative Meeting Record Format**

  Project teams may use a "meeting record" format instead of taking minutes at each meeting. The sample format (pp. 4-11,12) is used like a checksheet. Decide what categories should be permanent

Project Team Meeting Record, Part 1

Instructions: Use this page and the next as a blueprint for creating a meeting record tailored to your team. You can then make copies of this form and have the scribe take notes on each topic dicussed. He or she would then complete the summary items on this side at the end of the meeting.

Meeting Number _____ **Date** _______ **Location** ______________

1. Project name ______________________
2. Mission statement:

---

3. √ To indicate "present"

Member ______________

Member ______________

Member ______________

Member ______________

Member ______________

Member ______________

Member ______________

Member ______________

Others attending:

4. Agenda: Enter key words indicating the agenda topics. Check off an item when it is completed. Items you do not complete should be carried over to the next meeting.

( ) 1. Warm-up
( ) 2. Agenda review
( ) 3.
( ) 4.
( ) 5.
( ) 6. Set agenda for next meeting
( ) 7. Meeting review

5. Brief summary of topics, decisions, or conclusions and next steps (on reverse side).

6. Futures file: items for future consideration but not for the next meeting.

7. Meeting Review

"+" "—"

Next meeting:

Date_________ Time _________ Location ____________

Recorder:________________________________

Signature of recorder:______________________

Project Team Meeting Record, Part 2

Instructions: Take notes during the meeting on a page like this. Focus on capturing the main ideas associated with topic discussed. Summarize the discussion whenever possible.

Topic 1: (brief description) **Main Points:**

Decisions/Conclusions:

Next Steps:

Topic 2: (brief description) **Main Points:**

Decisions/Conclusions:

Next Steps:

Topic 3: (brief description) **Main Points:**

Decisions/Conclusions:

Next Steps:

Topic 4: (brief description) **Main Points:**

Decisions/Conclusions:

Next Steps:

Model Agenda for a Project Team's First Meeting

Instructions: Use this agenda as a model for your first meeting. On your form, enter the name of the team (if you have already decided on one), and its main goals or objectives. We have included time estimates for each item (for a total meeting length of about 3.5 hours). Keep track of the actual times so you can get good at predicting how long your meetings will have to last. If you think you will not have enough time to finish all the items, indicate which are "musts" for this meeting. **Be sure to schedule regular breaks in meetings of this length.** This format differs slightly from that for regular meetings.

Project Team ______________________ **Meeting Date** __________

Goals for Improvement:
Note: Have your team goals listed on the agenda. They can be typed onto the master form before it is copied.)

1. **Review this agenda** (5 mins.)
   Add items, delete items, estimate the time needed for each item. Rank the item: must do today / should do today.
   Note item types: announcement, discussion, decision, action.

2. **Brief self-introductions by team members** (10 mins.)

Review the mission statement from the management team (15 mins.)

4. **Explain the goals of this meeting** (10 mins.)

5. **Get acquainted with each other** (35 mins. total)
   - An icebreaker in pairs followed by a group activity. (20 mins.)
   - A more detailed discussion of the process assigned to us for study. A description by all members of their roles in that process. (15 mins)

6. **Define the roles of team leader, quality advisor, and team members** (10 mins.)

7. **Set ground rules and housekeeping rules** (10 mins.)

8. **An introduction to some basic concepts** (60 to 90 mins.)
   - Deming's 14 points / Joiner Triangle
   - The scientific approach
   - What is a process?
   - Customers and Vendors
   - The 85/15 rule.
   - How this project fits into our organization's larger effort
   - Our partnership with the management team

9. **An assignment for the next meeting: date, time** (10 mins.)
   Discuss possible readings or activities that team members can undertake before the next meeting.

0. **Meeting Evaluation; questions and discussion** (15 mins.)

TQC STORYBOARD
SYSTEMATIC PROBLEM SOLVING

1. PROJECT SELECTION

Objective:

To select a specific problem or process which needs improvement.

Possible Activities:

Select a significant issue. Possible sources of information about a significant issue may come from 1) customers, 2) management direction, or 3) the work group.

2. TEAM FORMATION

Objective:

To designate initial members of the improvement team, and clarify roles and responsibilities.

Possible Activities:

1. Determine whether a team approach is appropriate.
2. Identify initial team members and define responsibilities of members.
3. Select a team leader and define responsibilities of the leader.
4. Clarify roles of team members and leader.

3. PURPOSE STATEMENT

Objective:

To clarify the **purpose** of the project.
To determine **performance measures**.
To develop a tentative **timetable**.

Possible Activities:

In clarifying **project purpose:**

1. Identify stakeholders from whom you want to learn about needs and purposes.
2. Ask questions that expand purposes, for example:

   What are we really trying to do when we perform this activity?

   What are the purposes and needs of the customer?

   Is this problem part of a larger function?

In selecting **performance measures:**

1. Consider what the effects will be if the project is completely successful.
2. Determine a performance measure to track, based on the expected effects.

In developing a **timetable:**

1. Estimate the time required to complete the project.
2. If appropriate, review projected timetable with the team sponsor.

4. CURRENT SITUATION

Objective:

Understand and explain the problem or process being studied.

Possible Activities:

1. Find out about the problem. Go to the site of the problem. Talk to people familiar with it. Clarify and expand your understanding of the problem.
2. Check the recent results of the performance measure and graph them.
3. Determine an improvement target, as gauged by the process measurement.
4. Do not be concerned with possible solutions at this stage. Try to expand your understanding of the current situation.

Basic Problem Solving Tools Which May Be Helpful in the S.P.S. Process

BASIC TOOLS / STEPS	BRAINSTORMING	NOMINAL GROUP TECHNIQUE	FLOW CHART	CAUSE & EFFECT DIAGRAM	CHECK SHEET	PARETO CHART	HISTOGRAM	RUN CHART	CONTROL CHART
CURRENT SITUATION			•		•	•	•	•	
ANALYSIS			•	•	•	•	•	•	•
IMPROVEMENT PLAN	•	•	•	•	•				
RESULTS			•		•	•	•	•	•
STANDARDIZATION			•	•	•				
REMAINING ISSUES	•	•		•	•	•			
LESSONS LEARNED	•	•							

5. ANALYSIS

Objective:

Identify and verify the root causes of the problem.

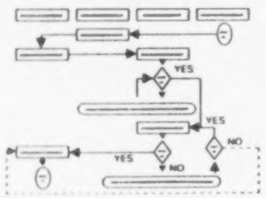
Possible Activities:

1. Study the process flow.
2. Study cause and effect relationships. Ask who, what, where, when, why and how questions to pursue the root cause.

   Determine whether standard methods are in place. If so, are the people doing the work familiar with them? Do they follow them? If not, why?

4. Collect and analyze the necessary data.
5. Use the Pareto Principle to set priorities (tackle the major causes first).
6. Run experiments to verify possible causes of problems.

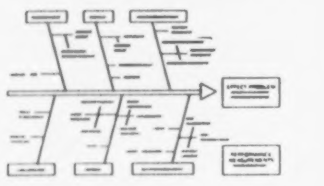
FLOW CHART



TIPS FOR USE

- Understand the purpose of the flow charting.
- Describe the process as it actually is.
- Involve the people who understand what is really happening in the process.
- The intended purpose will help you judge the level of detail.

CAUSE AND EFFECT



TIPS FOR USE

- Clearly define the effect for which causes must be identified.
- Determine how the effect can be measured.
- Use the chart as a "living document". Add notes and cards to the charts as you learn about potential causes.

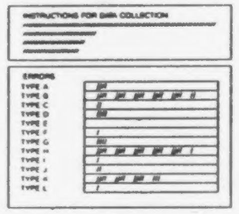
6. IMPROVEMENT PLAN

Objective:

To propose improvements (countermeasures).
To select and test the most promising countermeasures.

Possible Activities:

1. Develop potential improvement actions, or countermeasures, based on the team's analysis.
2. Select the countermeasure(s) to be tested.
3. Implement the countermeasure(s) on a trial basis.

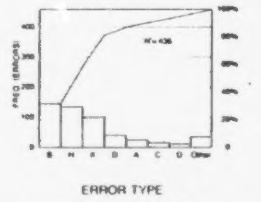


CHECK SHEET

TIPS FOR USE

- Design the sheet to meet the specific needs of the data collection.
- Understand the data collection and their environment.
- Keep the form as simple as possible.
- Prepare instructions for the data collectors.
- Test the form and instructions.
- Audit the collection process and validate the results.

PARETO CHART



TIPS FOR USE

- Mark the chart clearly to show the unit of measurement ($, %, #, ...)
- Show the total of occurrences.
- Work with at least ten occurrences; preferably many more.
- Don't stop after the first chart. Make a second-level chart of the major cause(s).

7. RESULTS

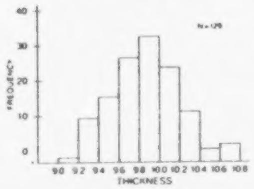
Objective:

To measure the effect of the countermeasure and compare the results to the improvement target.

Possible Activities:

1. Gauge the effects of the improvement actions by studying the performance measure. Has the target been met? If not, is there significant movement in the right direction?
2. If the results are not completely satisfactory, it may be necessary to initiate other countermeasures.
3. Consider the effects - good and bad - elsewhere in the system.

HISTOGRAM
(Part Thickness)



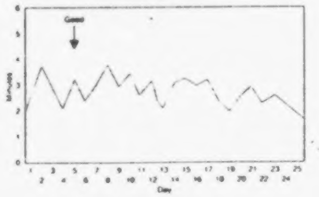
TIPS FOR USE

- The number of data points determines the number of groups on bars.

Points	Bars
Under 50	5-7
50-100	6-10
101-250	7-12
Over 250	10-20

- Clearly label the vertical and horizontal scales.
- Show the total number of data points.

RUN CHART
(Minutes to Produce)



TIPS FOR USE

- The time period covered and unit of measurement must be clearly marked.
- If a trend in one direction is desirable, add the word "good" to the chart, with an arrow pointing in the desirable direction.

8. STANDARDIZATION

Objective:

To assure that the effective improvement actions become a part of the regular routine of the process.

Possible Activities:

1. Identify what must be done to change the system permanently and make these changes.
2. Develop ways to ensure that new associates will be trained in the new method.
3. Consider checking and control mechanisms to assure maintenance of improvement.

9. REMAINING ISSUES

Objectives:

To list problems and issues which remain or were discovered as a result of this project.
To determine appropriate action for each item.

Possible Activities:

1. List problems or opportunities which remain.
2. Determine which other business units might be able to benefit from your work. Share results with them.

10. LESSONS LEARNED

Objective:

To evaluate what the group has learned about the problem solving process itself.

Possible Activities:

1. Discuss what worked well and what didn't. What would the group do differently next time?
2. Celebrate the wrap-up of the project. Congratulate yourselves for learning new skills and honing old ones. Have some fun!

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SESSION IV

SESSION 4

TOPIC D

- Identify successful team building techniques

Seminar Presentations

1. Your leadership style - (25 activities)

2. Basic flow of team activities - 10 Steps - Memory Jogger - page 68

3. Getting started setting the stage for team building - "Characteristic of Effective Team Members"

4. Ten Essentials of Team Work

Reading Assignment

- Memory Jogger - pages 24-29 and 69-80

Project Assignment

- Write down and bring to the next session (200 words)
  "A production problem in your work area"

[redacted]

Leadership Style

Goals: I. To help the participants to distinguish between different styles of leadership.

II. To introduce the concept of selecting a leadership style to suit the situation.

III. To explore the difference between appropriate leadership style and authentic behavior (that is, just being yourself).

Group Size: Ten to twenty participants.

Time: One and one-half hours.

Materials: I. A copy of the Leadership Style Questionnaire for each team member.

II. A copy of the Scoring and Analysis sheet for each team member.

III. A pencil for each team member.

IV. A newsprint flip chart and felt-tipped markers.

V. Masking tape for posting newsprint.

Procedure: I. The leader introduces the activity with comments such as the following:

In this activity, we will consider the question of whether all group leaders should behave alike. Some people believe that the best leadership is provided when the leader behaves in an authentic manner, that is, the feelings and behavior of the leader are open and congruent. The belief is that it is best to be yourself. Others believe that different situations call for different leadership behaviors, even different attitudes, on the part of the leader. We are going to examine this issue and, in the process, learn more about the skills of leadership.

II. The participants are divided into groups of five or six members each. A copy of the Leadership Style Questionnaire, a copy of the Scoring and Analysis form, and a pencil are given to each member.

III. One half of the groups are directed to answer the questionnaire from the point of view of a "discussion group leader" and to write that title at the top of the questionnaire. The other half of the groups are directed to answer the

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Adapted from C.R. Mill, "Situational Leadership" (1980). In *Activities for Trainers: 50 Useful Designs*. San Diego, CA: Pfeiffer & Company.

questionnaire from the point of view of a "director of a task force" and to write that title at the top of the questionnaire.

IV. The leader announces that the members will have forty minutes in which to answer the questionnaire, score it, and discuss the results within their small groups.

V. The leader may want to offer assistance to individual members to see that the scoring is done properly.

VI. The entire group is reassembled for a discussion of the following questions:

1. If any of the members achieved a "perfect" score, did those individuals feel that some of their answers called for unauthentic behaviors?
2. In what way did members of the group differ in their interpretations or acceptance of the answers?

VII. Using group members' contributions, the leader lists on newsprint the goals of a group discussion leader and those of a task force director. Then the leader asks the members to determine whether different behaviors might be necessary to achieve these goals.

VIII. The leader asks the members to identify some skills that they still need to develop in order to be versatile leaders.

Leadership Style Questionnaire

You are the leader of a ______________________________

Instructions: There are ten situations described in this questionnaire. Each situation has three alternative actions listed; they are possible attitudes or positions that you might have as the group leader or director. Read each of the alternative statements and rank them in the following manner:

Write 3 next to the position you would be **most likely** to take on the statement.

Write 2 next to the position you would be **next most likely** to take on the statement.

Write 1 next to the position you would be **least likely** to take on the statement.

1. The leader of a meeting should:

______ (1) Focus attention on the agenda (either written or hidden).

______ (2) Focus attention on each person's feelings, in order to help the members to express their emotional reactions to the issue.

______ (3) Focus attention on the different positions members take and the ways in which they deal with one another.

2. As a primary aim, the leader should:

______ (4) Establish a group climate in which work and accomplishment can take place.

______ (5) Establish a climate that encourages openness and caring.

______ (6) Help group members to find themselves as members of the group.

3. When strong disagreement occurs between a group leader and a member, the leader should:

______ (7) Listen to the member and try to ascertain whether the task is understood.

______ (8) Try to get other members of the group to express themselves in order to involve them in the issue.

______ (9) Support the person for presenting his or her views.

4. In evaluating a group's performance, the leader should:

______ (10) Involve the whole group in assessing its learnings and satisfaction.

______ (11) Get the group to compare its achievement with the goals it had set.

______ (12) Allow each person to set his or her own goals and performance standards.

5. When two members of the group get into an argument, the leader should:

______ (13) Help them deal with their feelings as a means of resolving the argument.

______ (14) Encourage other members to help resolve it.

______ (15) Allow some time for the expression of both sides, but keep the discussion related to the task and subject at hand.

6. The best way to motivate someone who is not performing up to his or her ability is to:

_______ (16) Point out the importance of the group's work and your need for everyone's contribution.

_______ (17) Inquire into the underlying problem in order to understand the reason for the low performance.

_______ (18) Not be concerned; the person will contribute when he or she is ready.

7. A leader's evaluation of a session should focus on:

_______ (19) The smoothness and efficiency with which the session was conducted.

_______ (20) Whether everyone contributed his or her ideas and opinions.

_______ (21) Developing a sense of achievement in both the leader and the members.

8. In dealing with hidden agendas (e.g., minority issues, low motivation), the leader should:

_______ (22) Deal openly with such issues if they threaten to disturb the relationships in the group.

_______ (23) Confront the issues quickly so that they do not divert the group.

_______ (24) Show understanding and get all the members to help deal with the issue.

9. As a goal, the leader should:

_______ (25) make sure that all the resources of group members are known and used.

_______ (26) Draw out controversy and differing opinions that may contribute to the group's goal.

_______ (27) Encourage members to contribute, if they want to do so.

10. The leader's greatest contribution to a group is to:

_______ (28) Model attitudes and behaviors that shape the group's energy.

_______ (29) Establish a climate in which true attitudes and feelings are expressed.

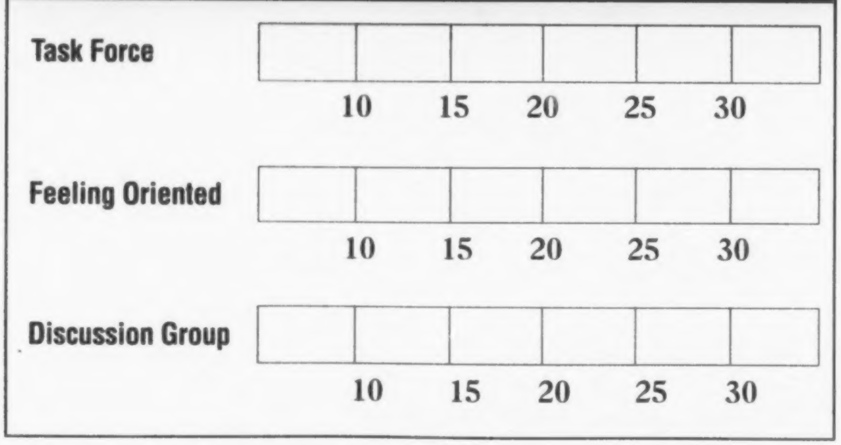
_______ (30) Lead subtly and allow members full opportunity to interact.

Scoring and Analysis

Instructions: In the columns below, next to the number of the situation, enter the number of your ranking for each action statement. Please note that the order of the numbers in the columns does not correspond with that of the questionnaire itself. In question 3, for example, the column positions are, from left to right, 7,9,8, not 7,8,9.

Situation	Action Statement	Rank	Action Statement	Rank	Action Statement	Rank
1.	(1)		(2)		(3)	
2.	(4)		(5)		(6)	
3.	(7)		(9)		(8)	
4.	(11)		(12)		(10)	
5.	(15)		(13)		(14)	
6.	(16)		(17)		(18)	
7.	(19)		(21)		(20)	
8.	(23)		(24)		(22)	
9.	(25)		(27)		(26)	
10.	(28)		(29)		(30)	
Total						
		Task Force		Feeling Oriented		Discussion Group

Group Leadership Style



Transfer your total score for each of the columns to the bar graphs by shading the bar to the point representing your score. For comparison purposes, if you have a score of less than 30 in the type of group leadership that was assigned to you, then either your intuitive choice was erroneous for that situation or you may have a real and logical difference of opinion with the "answer." The real question is: Can you change your leadership style according to the needs of the situation?

CHARACTERISTICS OF AN EFFECTIVE TEAM

1. APPROPRIATE LEADERSHIP. The leader has the skills and desire to develop a team approach and allocates time to team-building activities.

2. SUITABLE MEMBERSHIP. Team members are individually qualified and contribute to the mix of skills and characteristics that provide an appropriate balance.

3. COMMITMENT TO THE TEAM . Team members are committed to the aims and purposes of the team.

4. CONSTRUCTIVE CLIMATE. The team´s climate encourages people to feel relaxed, able to be direct and open and prepared to take risks.

5. DESIRE TO ACHIEVE. The team is clear is about its objectives which are believed to be worthwhile.

6. CLEAR CORPORATE ROLE. The team contributes to corporate planning and has a distinct and productive role within the greater organization.

7. EFFECTIVE WORK METHODS. The team has developed lively, systematic, and effective ways of solving problems.

8. ROLE CLARITY. Roles are clearly defined, communication patterns are well developed, and administrative procedures support the team approach.

9. CRITIQUE WITHOUT RANCOR. Team and individual errors and weaknesses are examined without personal attack to enable members to learn from experience.

10.WELL-DEVELOPED INDIVIDUALS. The latent potential of team members is fulfilled by their membership in the team. They become more outgoing and capable, and their professional competence is enhanced as they meet new challenges with one another´s support.

11. CREATIVE STRENGTH. The team generates new ideas from the interactions of its members .Some innovative risk taking is rewarded, and the team will support new ideas both from its members and from the outside. Good ideas are put into action.

12. POSITIVE INTERGROUP RELATIONS. Relationships with other teams are developed systematically to maintain contact with others and to identify opportunities for collaboration.

[redacted]

Getting Started: Setting the Stage for Team Building

Goals:

I. To assist the team members in creating an agenda for a team-building session and in rank ordering the items on that agenda.

II. To generate ownership of and commitment to commonly perceived problems that face the team.

III. To develop the team members' listening skills.

Time: Approximately one hour.

Materials:

I. Blank paper and a pencil for each team member.

II. A newsprint flip chart and a felt-tipped marker.

III. Masking tape for posting newsprint.

Setting: A room large enough so that pairs of team members can meet privately without disturbing one another. Writing surfaces and movable chairs should be provided.

Procedure:

I. The leader discusses the goals of the activity and gives a brief overview of the design.

II. The team members are given paper and pencils and are instructed to form pairs. The leader stipulates that each team member should select a person with whom he or she has not talked recently.

III. When the pairs have assembled in separate places in the room, the leader tells the partners to take turns interviewing each other on the topic "What problem situations should we work on in our upcoming team-building session?" The leader states that each interview should last five minutes and that the interviewer should make notes on the content of the interview. Then the team members are told to begin.

Adapted from J.E. Jones, "Agenda Setting: A Team-Building Starter," in J.W. Pfeiffer and J.E. Jones (Eds.) (1975). *A Handbook of Structured Experiences for Human Relations Training* (Vol. V). San Diego, CA: Pfeiffer & Company.

IV. After the interviewing phase has been completed, the team is reassembled in a circle. The members take turns reporting what their partners said, and the leader lists on newsprint each member's suggested problem situations (in the member's own words). Each member whose comments appear on newsprint then adds anything that the interviewer left out and/or corrects any misperceptions. During this phase, the team member's are told that they may respond only by asking questions for clarification.

V. The lists of problem situations are posted, and the items are numbered. Duplicates are combined or are given the same number.

VI. The leader instructs each team member to select, by number, the three problem situations that he or she believes are most important. Then the leader tallies on the newsprint the number of members who have indicated each of the items.

VII. The leader posts a new list of the items with the highest frequencies in the tally.

VIII. Each team member is instructed to rank order these problem situations independently, in terms of which are most important. The rank of 1 is to be assigned to the item that the member believes must be discussed if the team-building session is to be successful. The second-most-important situation is to be ranked 2, and so on.

IX. The leader tallies the ranks assigned to the items by asking how many members ranked each item as 1, 2, 3, and so on. (If there are more than six or seven items, the tally may be based on a ranking of high, medium, or low.)

X. The leader posts the final agenda on newsprint and then leads a discussion of reactions to the agenda-setting process.

Variation: If the team-building session is to be held immediately after this activity, the interview time may be varied as necessary. If the agenda-setting time is limited, the interviewers may ask for the one problem situation that needs to be faced by the team.

SESSION V

SESSION 5

TOPIC E

- Problem solving skills

Seminar Presentations

1. Memory Jogger - pages 24-29 and 69-80

2. Problem solving tools
    a. Brain storming
    b. Nominal group techniques
    c. Cause and effort diagram
    d. Pareto chart
    e. Flow chart
    f. Run chart
    g. Histogram

3. Team Survival Drill

Reading Assignments

1. Chapter 6 - "Developing Successful Quality Improvement Team"

Project Assignments

1. Sub-teams of 3 person develop a 1000 word presentation on how their team helped Diamonite win The Malcolm Baldridge Award in 1997 - due in Session 9.

2. It is 1997 and your team is one of five teams at Diamonite to be honored for increased production.

Your assignment is to write a 500 word article about what your team has done to achieve this award. The article is to be published in Fortune Magazine. You can use charts, graphs, pictures and text in your article. You will be making a presentation in class.

Assignment is due the last class session.

/

NASA Experiment Individual Worksheet

Instructions: You are a member of a space crew originally scheduled to rendezvous with a mother ship on the lighted surface of the moon. Due to mechanical difficulties, however, your ship was forced to land at a spot some 200 miles from the rendezvous point. During landing, much of the equipment aboard was damaged, and since survival depends on reaching the mother ship, the most critical items available must be chosen for the 200 mile trip. Below are listed the 15 items left intact and undamaged after landing. Your task is to rank order them in terms of their importance to your crew in allowing them to reach the rendezvous point. Place the number 1 by the most important item, the number 2 by the second most important, and so on, through number 15, the least important. You have 15 minutes to complete this phase of the exercise.

_____ Box of matches
_____ Food concentrate
_____ 50 feet of nylon rope
_____ Parachute silk
_____ Portable heating unit
_____ Two .45 caliber pistols
_____ One case dehydrated PET milk
_____ Two 100-lb. tanks of oxygen
_____ Stellar map (of the moon's constellation)
_____ Life raft
_____ Magnetic compass
_____ 5 gallons of water
_____ Signal flares
_____ First aid kit containing injection needles
_____ Solar-powered FM receiver-transmitter

NASA Experiment Group Worksheet

Instructions: This is an exercise in group decision-making. Your group is to employ the method of Group Consensus in reaching its decision. This means that the prediction for each of the fifteen survival items must be agreed upon by each group member before it becomes a part of the group decision. Consensus is difficult to reach. Therefore, not every ranking will meet with everyone's complete approval. Try, as a group, to make each ranking one with which all group members can at least partially agree. Here are some guides to use in reaching consensus:

1) Avoid arguing for your own individual judgments. Approach the task on the basis of logic.

2) Avoid changing your mind only in order to reach agreement and avoid conflict. Support only solutions with which you are able to agree somewhat, at least.

3) Avoid "conflict-resolution" techniques such as majority vote, averaging or trading in reaching your decision.

4) View differences of opinion as helpful rather than as a hindrance in decision-making.

_____ Box of matches
_____ Food concentrate
_____ 50 feet of nylon rope
_____ Parachute silk
_____ Portable heating unit
_____ Two .45 caliber pistols
_____ One case dehydrated Pet milk
_____ Two 100-lb. tanks of oxygen
_____ Stellar map (of the moon's constellation)
_____ Life raft
_____ Magnetic compass
_____ 5 gallons of water
_____ Signal flares
_____ First aid kit containing injection needles
_____ Solar-powered FM receiver-transmitter

Chapter: 6

Developing Successful Quality Improvement Teams (THE PROCESS)

Learning Objectives:

- **To establish an understanding of the concepts of developing a process for success.**
- **To introduce the principles for developing quality improvement teams.**

INTRODUCTION:

In order for your organization to successfully develop quality improvement teams, a combination of PRINCIPLES must be present to insure a quality process.

System design will determine the successful accomplishment of organization and team objectives. Organizations are structured around systems. It is important to understand that operation systems can be in direct conflict with objectives.

This chapter explains seven principles that must be followed to ensure the success of your quality improvement efforts.

PRINCIPLE 1: DEVELOPING A MISSION STATEMENT

The process begins with a quality mission statement. Every effectively functioning team that I've ever encountered had a clear understanding of its purpose. Without exception, the one characteristic that appears as a constant in quality improvement environments is a "sense of purpose." Quality improvement teams have a vision of what they want to accomplish that is supported by action. They have a clear understanding of what goal they want to achieve and a belief that the goal is in the best interest of the organization. It is important that Quality Improvement Teams align their mission with the mission of the organization/institution. Mission statements must be designed so that they encourage people to interact freely.

The clearer the vision of what is to be accomplished, whether it is solving a current problem, launching a new venture, or improving a process, the more effective the organization will be.

It is important that the mission of the team is focused toward improvement of the overall purpose. The loss of focus toward overall purpose occurs when politics and individual agendas become the main focus point.

ACTIVITY:
Can you identify any political or individual agendas in your environment. It is important to realize that political or individual agendas place barriers between what **should** be happening and what **is** happening.

What is a Mission Statement?

The mission statement is a summary of the expected outcomes that reflect values and principles that govern the improvement process. The mission statement should be **quality driven, customer focused, and can be short or long-term oriented.**

Why have a Mission Statement?

The mission statement supports the overall purpose of the organization. It provides for common direction for setting strategic, operational and improvement objectives. Above all the mission statement provides criteria for evaluation of long and short-term decisions.

What are the components of a Mission Statement?

The customer is usually the main component of a mission statement. The statement should include the quality standard of inputs and outputs and the overall contribution that the team makes to the organization. The mission statement can include any other characteristic the team believes is vital to the success of the operation.

What is the difference between the Organization's Mission Statement and the Quality Improvement Team's Mission Statement?

The organization's mission statement is broad in focus and is the overall guiding force for Quality Improvement Teams. It is long-term while the mission statements of Quality Improvement Team's is short term. A QIT's mission statement is written to support the overall mission of the organization.

ACTIVITY:

This activity can assist you in writing a mission statement for your environment or your quality improvement team.
Note: Before you can write a team mission statement there must be an organization mission statement. The team mission statement will be in alignment with the organization's mission statement.

*1. Think about the purpose of your organization or your quality improvement team. What are the expections of your customer.

*2. As a team, brainstorm the purpose of your organization as it relates to customer expectations. Customers are both internal and external.

*3. Focus on all stakeholders of your organization and what actions will take to stay competative in this every changing world.

*4. Write down some criteria that you feel are **important** to your organization or quality improvement team mission statement.

What criteria must be satisfied?

____

____

____

Identify your stakeholders? A stakeholder is anyone who provides inputs or outputs, external or internal to your operation; such as employees, students, clients, customers, suppliers, and community.

____

____

____

What are your stakeholder's expectations?

____

____

____

What is the nature of your organization?

____

____

____

What is the nature of your quality improvement team?

Identify your customers, internal and external?

What are their expections?

What are your outputs?

What inputs do you need?

What are other vital components?

Now as a team, brainstorm: Ask questions such as

- **Why does this organization or work unit exist?**

- **What is the value added by this work unit?**

- **What results or outcomes are expected form this work unit?**

____
____
____
____

- **What is this work unit's overall contribution to the company?**

____
____
____

Combine your responses into one statement headed "Mission Statement." Use several sentences. However, keep your mission statement simple. It is important to understand that a mission statement deals with the work units continuing contribution and acts as a bridge to the organization's mission statement.

WRITE A QUALITY MISSION STATEMENT:
What values need to be incorported into our mission?
What principles should guide our mission?

____
____
____
____

QUALITY IMPROVEMENT ENVIRONMENTS MISSION OBJECTIVES SHOULD INCLUDE MOST OF THE FOLLOWING:

- Customer Satisfaction
- Quality and Service
- On-Time Delivery
- Never-Ending Improvement
- Cost Improvement
- People Improvement
- Commitment to Training
- Trust - Honesty - Respect - Dignity
- Commitment to Safety
- Commitment to Employee Welfare
- Commitment to Education
- Opportunity for Employee Growth
- System Improvement
- Breaking Down Barriers
- Driving out Fears
- Promoting Pride of Workmanship
- Working as a Team
- Labor-Management Cooperation
- Above All POSITIVE CHANGE

PRINCIPLE 2: MUST BE DRIVEN TOWARD QUALITY IMPROVEMENT FOR CUSTOMER SATISFACTION

Quality improvement teams must be structured toward the achievement of desired outcomes. The total system must be driven toward the overall quality improvement of the organization. The quality improvement process means that the improvement of people, product, service and environment is a continuous process.

It is important to develop a philosophy of never-ending-improvement. Being driven toward quality improvement must be a way of doing business on a **daily**, yes, **hourly**, basis. This is a Total Quality Management Process that must be a way of life. The continuous improvement process becomes a "habit."

When organizations are quality improvement driven, we all benefit. With each improvement process, the systems function more effectively. Productivity increases as waste goes down. Customers get better products and service, which provides better return on investment. As quality improves the cost of doing business goes down. We make maximum use of time, energy and resources.

Structure must be free of hidden agendas. Most problems that go unresolved do so because people engage in behaviors that produce distrust, game playing, hidden agendas, self-vested interests and favors. The focus is not driven toward quality improvement, but rather becomes a question of "What's in it for me," or "How can I receive the maximum benefit with the same or less accommodation on my part?"

Quality improvement teams must be permitted to solve problems without walls. The structure should permit team members to be creative, innovative and free to deal with problems that affect their immediate area. This will require cross-functional activities that permit each unit to assist one another. Every person in the process must realize that they are all driven toward the same outcome, and that outcome as "quality."

PRINCIPLE 3: QUALITY IMPROVEMENT TEAM MEMBERS MUST BE COMPETENT

Team members must have the ability to deal with the situation. The team must be able to analytically take a situation, issue or problem apart from an investigative standpoint. They should be able to identify what the problem is and what the problem is not. Team members should be competent in technical problem solving skills, conceptual skills and human relation skills.

- They should be able to determine the cause of the problem.
- They should be able to use problem solving tools (e.g. brainstorming, force-field analysis, cause and effect charts, pareto charts, etc.)
- They should be able to justify the improvement.
- The should be able to work well with people.
- They should know when to lead and when to follow.
- They should be able to work toward the overall mission and not be involved for personal gain.
- They should attend team meetings willingly and invest the time necessary to investigate and improve.
- They should have a creative imagination.
- They should have a clear understanding of the value of internal and external customers and be customer driven.
- They should be quality driven, quality conscious, and quality performers, ask unusual questions, and communicate assertively.
- They should be honest and trustworthy and not allow self-vested interests to have bearing on the facts gathered or decisions made.
- They should care about the human side, and have an understanding of social responsibility and community pride.
- Above all, they should be good listeners, communicators and have excellent interpersonal skills.

PRINCIPLE 4: QUALITY IMPROVEMENT ENVIRONMENTS REQUIRE COMMITMENT TO THE MISSION

Commitment is often the most clearly absent feature of ineffective teams and organizations.

What is Commitment?

Commitment is believing in what the team is trying to accomplish. It is having pride and a sense of loyalty and dedication to the team. It is the willingness to do anything that is ethical to help the team reach its objective. Commitment is very difficult for some to understand because it means identifying with a group of people and placing everyone at the same level. **One of the most serious threats to the success of a team is conflict between self-vested interests and team objectives.**

A quality improvement team is when a group of people pull together with the commitment toward achieving organizational objectives.

COMMITMENT and PHILOSOPHY

Developing the philosophy starts with a commitment. Developing a quality environment requires an authentic commitment. Attempts to build a Quality Improvement Environment fail more often than we sometimes like to admit. Most often the failure is due to lack of will rather than lack of ability. When we have the will, we can find the way, but without the authentic willingness of effort, failure will be awaiting. Every person in the process must be committed to the improvement process.

WILLINGNESS AND ABILITY

Willingness and ability are the necessary and sufficient conditions for success in any objective-driven organization. To fully implement a High-Commitment Quality Environment into an organization, a very special kind of willingness is required. This kind of willingness is called authentic commitment. It is living what the organization's values. For example, organizations that value customer satisfaction don't put roadblocks between themselves and meeting the needs of the customer.

Regardless of an individual's ability level, it is almost impossible to achieve success without will. The importance of self-motivation cannot be overstated. What some organizations may lack in ability, they can make up with employees who have a high degree of willingness.

COMMITMENT IS THE FOUNDATION TO THE PURSUIT OF NEVER-ENDING IMPROVEMENT:

CHANGE

Organizations that value Never-Ending Improvement are organizations that have made a commitment to change. They have discovered that change is an on-going process. Change is something that is not feared, but rather something that is welcomed.

ENDORSEMENT

Endorsement is the back side of commitment. Both endorsement and commitment are forms of willingness and have a role to play in the success of quality improvement. However, the ultimate role of commitment is, by far, the greater. Endorsement is the impetus to empowerment.

Endorsement is the verbal or written permission for employees to give something a try. Upper management gives their endorsement. They give the permission to get started. Sometimes it may not appear to be much, but it is enough to get started. The road may be rocky, but the risk takers have the courage to invest their abilities in the ownership of the improvement process.

The greatest challenge facing those who have the **courage** to create a Quality Improvement Environment will be to help those who have the ability, but not the willingness.

COMMITMENT: A TWO-WAY STREET

With endorsement must come commitment. It is almost impossible to create a Quality Improvement Environment without both ends working in the same direction. Top management is responsible for developing the philosophy and then creating the environment that allows employees to work together to accomplish objectives. The CEO concept is when management makes the commitment to empower employees to improve their environment. However, employees must take ownership of their actions and responsibilities.

To be committed is an **ethical choice** that all employees must make. Commitment is a gift that we choose to give ourselves. Nobody can give you something that comes from within. In order for organizations to meet the challenge, commitment must come from all employees regardless of position or level within an organization.

PRINCIPLE 5: THE PRINCIPLE OF COMMITMENT, EMPOWERMENT AND OWNERSHIP

The process requires that top management make a commitment of never-ending improvement, and all the concepts, practices and principles that support the process. Employees must be **empowered** to solve problems and make decisions in regards to activities within their area of responsibility. The flip side of commitment is OWNERSHIP. Employees must take ownership and run their units as if they owned them.

Sometimes employees are reluctant to take ownership because with ownership comes accountability and responsibility. Quality becomes a practice that everybody is accountable for and performance becomes an individual's responsibility.

In a quality improvement environment employees must depend on their team to assist in making decisions that only a supervisor would make in the past. Everyone in the process must take ownership of the task they are responsible for. This makes each employee accountable for the success or the failure of the organization. However all three ingredients must be equal, commitment, empowerment and ownership. One cannot take ownership over something they have not been empowered to do. The commitment starts at the top.

PRINCIPLE 6: A COLLABORATIVE ENVIRONMENT IS A MUST

Working together is a fundamental ingredient to team success. Building a strong, productive, cooperative environment incorporates everything we have mentioned thus far and more.

From being mission driven to committed to quality, there are behavioral qualities that must be present to unify the climate. We expect these behavioral qualities in everyone, but they are not always present. Productive organizations that have invested in the long term commitment understand the importance of these behavioral qualities and we as reasonable adults have come to take for granted the presence of these qualities in basic human decency.

These qualities are simplistic, but not valued equally by everyone.

The Art of Being Assertive:
Assertive people make excellent team players.

Above all, an environment must be built around **TRUST**. Trust is produced in an environment that has the following elements:

1. Honesty
2. Open Communications
3. Respect
4. Involvement
5. Consistence

* Being honest means no lies, no hidden agendas. It is having strong ethical values.

* Communicating openly is the willingness to share and to be receptive to change. It is welcoming creative thinking, different perceptions and new ideas.

* Respect is treating all people with dignity, honesty and fairness.

* Involvement is what teams are all about. Involvement helps produce pride, motivation and autonomy. Involvement must be authentic.

- Consistency is being able to predict and expect behavioral qualities and responses.

One of the best books ever written on the subject of human relations is Dale Carnegie's How to Win Friends and Influence People. This book was first published in 1937 and to the amazement of Carnegie and his publisher, Simon U Schuster the book as sold over 15 millon copies. I believe that this book offers the reader many principles on how to be assertive and successful. Quality improvements teams should make these principles part of their code of conduct.

Carnegie present leadership principle in a nutshell.

1. Begin with praise and honest appreciation.
2. Call attention to people's mistakes indirectly.
3. Don't criticize, condemn or complain.
4. Ask questions instead of giving direct orders.
5. Become a good listener. Encourage others to talk about themselves.
6. Become genuinely interested in other people.
7. Praise the slightest improvement and praise every improvement.
8. Give the other person a fine reputation to live up to.
9. Use encouragement. Make the fault seem easy to correct.
10. Make the other person feel important --and do it sincerely.
11. Talk in terms of the other person's interests.
12. Show respect for the other person's opinions. Never say, "You're wrong."
13. If you are wrong, admit it quickly and emphatically.
14. Try honestly to see things from the other person's point of view.

PRINCIPLE 7: QUALITY IMPROVEMENT ENVIRONMENTS REQUIRE TRAINING

Team members, facilitators, leaders and management should be **trained** on the basics of Quality Improvement concepts. In order for teams to be successful members should not only understand but be able to apply the following key concepts.

QUALITY PRACTICES

- Why quality?
- A clear understanding of Quality Philosophy - people, product, and service.
- Knowing the needs of your internal and external customers.
- Knowing what is expected from suppliers.

- Introduction to KAIZEN Philosophy.
- Introduction to Total Quality Management Concepts
- Introduction to Dr. Deming
- Introduction to Dr. Juran

MANAGEMENT THEORIES:

- Introduction to Management Functions
- Introduction to Motivational Theory
  Maslow, Herzberg and McGregor

HUMAN RELATION SKILLS

- A clear understanding of Self-Leadership concepts, practices and principles.
- Need to have excellent intra-personal skills.
  - . Listening
  - . Dealing with Conflict
  - . Communicating Openly
  - . Developing Assertive Behavior Skills

TECHNICAL SKILLS

- Able to use problem-solving tools and to collect data
  - Brainstorming
  - Flowcharts
  - Pareto Charts
  - Force Field Analysis
  - Cause and Effect Diagrams
  - OTHERS

- Know how to conduct successful meetings.
  - Agenda
  - Code of conduct
  - How to select projects
  - How to take minutes

- Know how to make an effective presentation.

Exercise:

THE SYSTEM YOU WORK IN DETERMINES WHAT YOU CAN OR CANNOT DO:

ELEMENTS OF SYSTEM DESIGN:

STRUCTURE: System Design will determine the OUTCOME. Organizations are structured around systems. Sometimes your system can be in direct conflict with your objectives.

For example, your purchasing policies may be in conflict with your quality policies. Purchasing may be forced to go with the lowest bid, but the lowest bid does not meet your quality standards.

Processes - Organizations are made up of many processes and governed by policies and procedures. It is important to understand that what is in place today may have to change to be successful tomorrow. The guiding force of an organization is its mission statement.

PEOPLE: Make the System Work. In order to improve the overall system, it may require a paradigm shift on the part of some. All people must be in alignment with the mission statement.

EXTERNAL SOCIAL SYSTEM:

How does your organization deal with external influences?

Government
Union
Community
Competition
Education
Customer
Supplier

excercise continued:

EVALUATION YOUR PRESENT SYSTEM:

Look at each division in your organization.
Identify clear boundaries - in other words, "You stay out of my area." Ask the question: "Who is serving whom? "

Identify any present systems that must change for the success of a Quality Improvement Team Environment.

Why do they need to change?

NOTE: You may have to step on toes, but remember what is best for a quality environment is best for everyone.

What needs to change in order for the improvement process to begin?

excercise continued:

List those forces that are supportive of the change taking place and those that are hindering you from reaching your outcome.

Under **HELPING,** list things that are presently viewed as a positive strength and under **HINDERING,** list those thing that are a roadblock. The helping things are forces that will assist you, and the hindering are forces that are keeping you from your objective. The objective of this process is to design a system that will enable your team to reach its mission objective.

HELPING>>> <<<HINDERING **Desired Outcome**

Outcome: The **outcome** is the objective you want to achieve. Is the system working toward reaching the mission objectives of your organization? or your team? or, Are they hindering you from reaching your mission objective?

SESSION VI

SESSION 6

TOPIC F

- Development of Successful Quality Teams

Seminar Presentation

1. Highlight Chapter 6 - "Quality Team Management"
2. Quality Concept - Flow Chart - Two examples
3. Quality Concept - Process Identification
4. Quality Concept - Kaizun
5. Video - 26 minutes - Stuck on Quality

Reading Assignment

"Communications, Listening and Assertive Communications"

Project Assignment

Chapter: 7
Listening - A Conscious Process

Learning Objectives:

- **Understand the cause of most misunderstandings**
- **Understand the role of emotions in misunderstandings**
- **Understand and recognize warning signs of potential misunderstandings**
- **Understand the importance of extensions in communicating**
- **Understand how to become a good listener**
- **Understand the three attitudes of listening**

Introduction:

From corporate meeting rooms to employee involvement teams, it is likely that misunderstandings will occur. When a misunderstanding occurs as the result of a communication breakdown, there is some significant reason. One primary reason for misunderstanding is that people often choose to take a very powerful and protective position in order to protect their perceived territory based on their personal point-of view. Our view of the world is seen from within our acquired value system which tends to color or distort our point-of-view and the assumptions we make about others. We are taught by our culture to pass judgment and assign labels based on how we have come to see our world. Often what we hear said is entirely different from what the speaker actually means. Our "filtering" system is constantly taking in messages and cataloging them solely on how we see things; e.g. what we assume, what we value, what our current attitude is, and our present emotional state. Each filtering station can lead to misunderstanding because each one classifies and labels according to the individual's value system, and point of view often lets each of us hear without really listening. Our programming often keeps us from being receptive to a point of view different from our own.

WHY MISUNDERSTANDINGS OCCUR

According to Joel A. Barker, we become locked into our paradigm (a set of rules that governs our lives) and,as a result, misunderstandings occur. Misunderstanding results from two natural tendencies.

1. **Our tendency to make judgments about people and their intentions -** The more intense the differences between two people, the more critically they will pass judgment on each other. Recent studies tell us that most people are not aware of their evaluation based on individual differences. This leads us to believe that many judgments are made subconsciously.

2. **Our tendency to judge people's reactions by our points-of-view -** If people agree with our points-of view, our judgments are favorable. However, if people disagree with our point-of view, our judgments tend to be critical.

Leaders must be conscious of these two tendencies. If we are passing judgment based on programmed points-of view, we are making decisions based on the assumption that our point-of-view is more correct than any other. The understanding of these tendencies is vital to a team's or a leader's success.

BE AWARE OF EMOTIONS

When emotions are high, people usually tend to see things differently. Differing points-of view tend to create high emotional levels. An emotionally charged atmosphere is not conducive to openly comparing different viewpoints and sharing feelings. For this reason, some of the most serious misunderstandings go unresolved. However when emotions do surface, a good leader can listen for messages that may lead to unsolved problems or frustration. There may be some vital information in emotions that may not necessarily surface in a non-emotional exchange. In a good team environment everyone is encouraged to be open and honest. People are encouraged to disagree and to question the status quo. This is an important ingredient that enhances the never-ending improvement process.

THINGS TO LOOK FOR - SIGNS

As conscious observers, we should look for a change in actions, reactions, and/or behavior. Some signs to be aware of are:

- Change in tone of voice
- Eye contact or facial expressions
- Gestures and/or body language

Presence of one or more of these signs might tell us that a misunderstanding may be brewing. Since differing points-of view are often the culprit in misunderstandings, being aware of changes in behavior can help individuals to state their views in a positive, assertive manner, rather than a threatening, aggressive or a passive mode. In effect, the listener's reaction can be controlled.

If one becomes totally conscious of their behavior, many misunderstandings can be resolved before they start. However, the tendency to judge on the fear of being judged often makes this process difficult.

- Be conscious.
- Be sensitive.
- Have courage.
- Take risks.

The main objective is to understand another point-of view that is based on a value system other than the one you have acquired. By taking an active, assertive, conscious approach to listening, this objective becomes attainable. The understanding that makes for productive communications is that of sensitive empathy--sensitive listening attitude and a willingness to see the world through a different value system. You must put aside your own assumptions and prejudices to hear and understand attitudes which may not be your own.

SOLUTION - STRIVE TO IMPROVE! People who strive to improve are those who are becoming assertive. Assertive people don't let their paradigms become barriers between them and growth.

EXTENSIONS

An extension is an attitude that allows us to place ourselves in the other person's shoes. We must let go of ourselves and release our energy to sense the situation from the other's point-of-view. It then becomes necessary to check our sensitivity from time to time to make certain it is still valid and not becoming slanted to fit our original perception of the situation.

Remember: You should be conscious of your own actions. Don't allow others' reactions to you, stop you from being the best you can be.

We create our own surroundings. In order to be effective, sensitive communicators, we must strive to remove "our" world from its position at the center of our universe and instead let it become only a standard for comparisons. In doing this, we may be able to change or enhance our point-of-view, adding still another dimension to our understanding. Our communication skills are thereby expanded and we become the sensitive, effective communicators whose expertise and people skills are in demand.

The most helpful attitude in this process is to strive to become non-judgmental of the person and the situation. When we can hear and sense the world from another's viewpoint without judgment, our personal growth potential is limitless.

A CONSCIOUS LISTENING PROCESS

Hearing is with the ears, but listening is with the mind. If we listen with the mind, then we are making a conscious effort toward active listening. Conscious listening helps the receiver understand exactly the idea a sender intended. In order to listen, the listener must concentrate on exactly what the speaker is sending. Listening is an important part of our jobs. We spend about 30% of our time listening, but retain only about 25% of what we hear. A person speaks at a rate of 100-200 words per minute, but a listener's brain can process words much faster. There is idle brain time that **good listeners** use to concentrate on the

Few managers' experiences are more unpleasant than facing an irate employee. Whether concerns are real or imagined, the pressure created by face-to-face confrontation exacts an emotional toll from both supervisor and employee. The following suggestions may help to produce better listening skills and to help reduce the tension in face-to-face confrontations.

HOW TO BECOME A BETTER LISTENER

The following are tips for improving your listening skills presented by Keith Davis in his book Human Behavior at Work, Organizational Behavior.

1. **Stop talking!** - You cannot listen if you are talking.

   - People were given two ears but only one tongue, which is a gentle hint that they should listen more than they talk.

   - Listening requires two ears, one for meaning and one for feeling.

   - Decision makers who do not listen have less information for making sound decisions.

2. **Don't assume** in advance that the subject or the person is uninteresting, unimportant, or irrelevant.

   - Don't assume in advance that the subject is too complicated, too demanding.

   - Don't assume in advance that the material will be too simple, the coverage beneath your level.

3. **Put the speaker at ease.** Help the person feel free to speak. Create a permissive environment.

4. **Show the speaker you want to listen. (Stop-Look-Listen)**

   - Stop what you are doing.
   - Look-Give the speaker eye contact.
   - Listen with your mind, not with your ears.
   - Look and act interested. Do not read your mail while someone is talking. Listen to understand rather than to oppose.

5. **Create the right atmosphere.** If possible, a quiet place, free of distractions. Take your phone off the hook. Go easy on argument and criticism. Both put people on the defensive, and they may "clam up" or become angry. Do not argue; even if you win, you lose.

6. **Don't daydream or fantasize.** Don't let your mind focus away from the topic. In other words, **don't take a mini-vacation.**

7. **Listen to learn.** Hold your temper-an angry person takes the wrong meaning from words. Don't argue or criticize because the speaker may become defensive and "clam up."

8. **Be patient.** Allow plenty of time. Do not interrupt the speaker. Do not start talking until the speaker is finished. Do not start for the door or walk away.

9. **Ask questions.** Encourage the speaker to speak, but don't take over. Remember, you have to stop talking before you can listen. By asking questions you encourage the speaker and it shows that you are listening. It helps to develop points further.

UZELAC'S MODEL TO LISTENING

Uzelac's Model to Listening (fig. 6.1) deals with the psychology of listening. It is based on listening with the mind and presents a conscious process of listening.

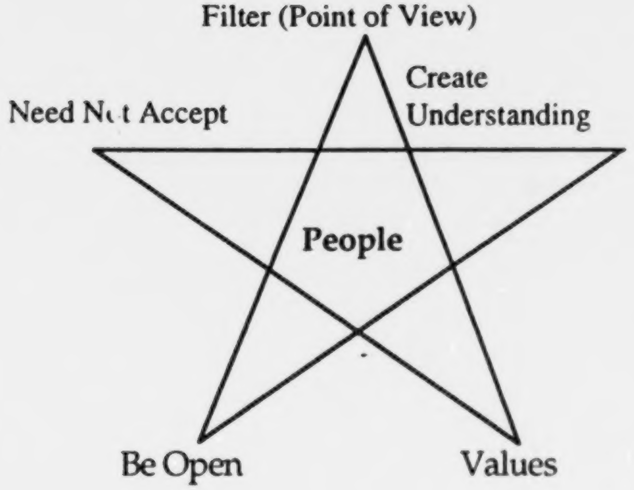


Fig 6.1 CONSCIOUS LISTENING PROCESS

Six factors of the conscious listening process are as follows:

- --People
- --Values
- --Being Open
- --Point-of-View
- --Understanding
- --Theory of Acceptance

***People-**All people are different and as a listener one must be able to deal with the differences of people. A good listener must put forth a conscious effort toward giving all people an equal value regardless of status. "Don't assume." The listener must remember that the receiver is also a person who deserves to be heard.

***Values-**What makes us different is what we value. One may place more value on family as compared to another placing more value on money or career advancement. Listeners must not let their values decide what they will or won't listen to. Regardless of what we value, others are entitled to their values.

***Being Open-**When listening to another person, don't let your biases, prejudices, or stereotyping block you from listening. Our values may keep us from tuning into what the person is saying. We may find ourselves closed to the issue because of our differences with the person sending the message. As a person in a position of responsibility, you cannot afford not to be open to the other person's views.

***Point of View**-It is important to realize that people have a right to their view. All people should be entitled to freedom of expression. Everyone does have a different perception of how an issue or situation can be viewed. Values, experience, personality, and method of communication affect a person's perception. Because these factors differ, each person's perception is unique. This explains why two people can view the same issue or situation in entirely different ways.

***Concept of Understanding and Acceptance**-The overall objective of this model of listening is to establish understanding and meaning. As the receiver of information, you have the responsibility to attempt a conscious understanding of the message. You should practice the tips on "How to Become a Better Listener." You want to make a conscious effort toward understanding. The total concept lends itself to understanding-NOT NECESSARILY ACCEPTANCE. It is NOT essential or necessary to accept others' points-of-view, but it is important to be open enough to understand their points of-view

LISTEN TO LEARN

Listening-To Solve Problems

In conclusion, we should develop a conscious attitude towards listening. We should understand that different situations may require unique listening attitudes. Three kinds of listening can be applied to different situations.

USE

Critical Listening when separating facts from opinions.

Creative Listening to integrate one's ideas with the ideas of others to achieve workable solutions to problems.

Sympathetic Listening to suspend judgment and allow others to talk out their problems.

Recommended Films:
Listening The Problem Solver
Barr Films
The Power of Listening
McGraw Hill
Discovering the Future - Joel Arthur Barker
Charthouse Learning Corporation

Quality Concept: Kaizen à la Tom Peters

Materials

3" x 5" cards and pencils.

Arrangement

Participants will work individually.

Time

Approximately twenty minutes (up to forty-five minutes, depending on discussion).

Objectives

To present the concept of "kaizen"; to encourage thinking about individual process improvement.

Mini-Lecture

"Kaizen" is a word that means small improvements, daily microsuccesses, a continual search for ways to be better than we are and to make our work processes better than they are. Management supports kaizen by means of things such as suggestion programs or by releasing time for process-action teams to meet. If management sets a tone of receptivity to new ideas, if management fosters innovation, if management truly believes in empowerment, kaizen can and will flourish.

But management must be secure enough to realize that a chipping away of the walls of the old order is the only way for our organizations to remain competitive. As management expert Tom Peters says in a brochure advertising his seminar, "If you have gone a whole week without being disobedient, you are not serving yourself or your company well." By "disobedient," Peters means thinking analytically about the standard operating procedure so that you can find ways to improve it.

[Distribute 3" x 5" cards and pencils to the participants.]

I'd like you now to record—anonymously—a brief description of the last time you were "disobedient." In other words, describe the last time you made a suggestion about changing the way in which things always have been done, or the last time you suggested to your boss that your way might be better than his or hers, or some shortcuts you have discovered in a recommended process. If you cannot think of one of these, think about a policy or procedure or process you would *like* to "disobey" because you think it is inefficient in its current state.

[Collect the cards, mix them up, and redistribute them (one to each participant). Give the participants a few minutes to read and think about the recorded

suggestions/improvements. Then conduct a discussion in which volunteers are invited to share either what they wrote or what they read on the cards.]

Quality Concept: Flow Charting

Materials

Sample flow chart, flip-chart paper, marking pens, and masking tape.

Arrangements

Participants will work in small teams of four or five members each.

Time

Approximately fifteen minutes.

Objectives

To develop flow-charting skills; to provide a means of analyzing a process.

Mini-Lecture

A flow chart is a valuable tool to help individuals and team members understand how a process currently works and to identify areas of waste or suboptimization. Sometimes, after we have flow-charted how the process actually works, we make another flow chart, showing how we wish the process would work. Then we compare the two to discover the problem areas.

We will not be going into that much detail in *this* activity. Instead, I want you to make a flow chart of a fairly simple process: the process of brushing your teeth. With your group, you will prepare a flow chart using these symbols:

⬭ to indicate the beginning and also the end of the process

▭ to indicate an action step

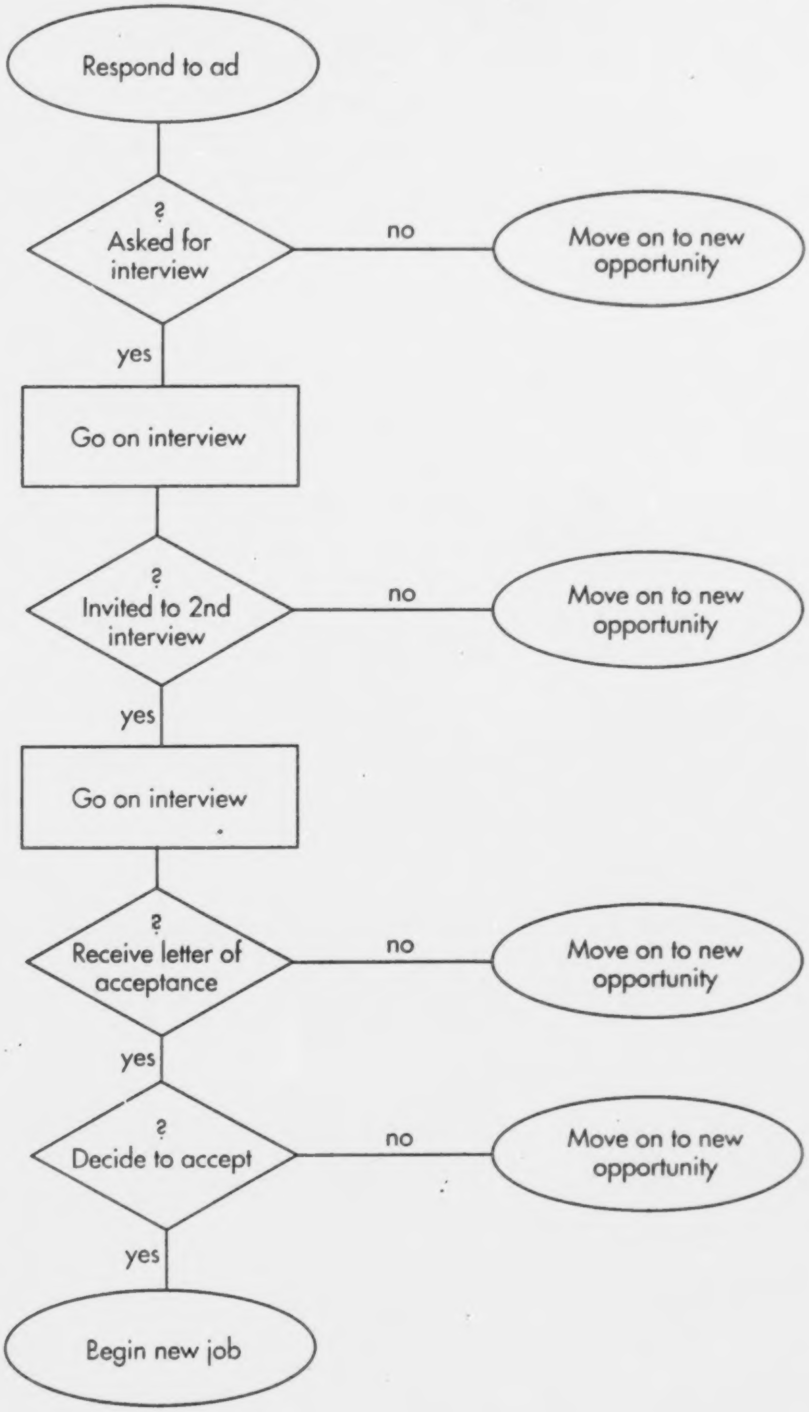
◇ to indicate a decision point, expressed as a question that can be answered "yes" or "no" (Be sure to show two resulting actions: one for the "yes" decision and one for the "no" decision.)

○ to indicate delay

This is an example of a flow chart for the activities and choices in responding to a job advertisement. **[Distribute handouts of sample flow chart or present a poster of it prepared ahead of time on flip-chart paper.]** Now you can begin to make your own.

[When the charts are completed, post them and encourage the participants to walk around and compare them. They will, no doubt, find that even so simple a process as brushing one's teeth can be approached in a variety of ways. Use this opportunity to point out how much can be learned when we create flow charts and then compare the processes. Emphasize that all work is process and that it is only by carefully analyzing our work processes that we can hope to improve them. The flow chart is a critical tool for the "process" of improving processes.]

Sample Flow Chart


Respond to ad
?
Asked for interview
no
Move on to new opportunity
yes
Go on interview
?
Invited to 2nd interview
no
Move on to new opportunity
yes
Go on interview
?
Receive letter of acceptance
no
Move on to new opportunity
yes
?
Decide to accept
no
Move on to new opportunity
yes
Begin new job

PROCESS: Responding to an advertisement for a job

Quality Concept: Process Identification

Materials

If possible, business-card-sized rectangles (one per participant). If this is not possible, 3" x 5" cards will do.

Arrangements

Participants will work individually.

Time

Approximately ten minutes.

Objectives

To enable participants to identify the specific purposes behind their work processes; to encourage creativity.

Mini-Lecture

The Walt Disney Company recently created a new position: "Vice President of Corporate Synergy." At Apple Computer, executives work in the "Paleomorphic (old form) Technology Suppression area." Other companies have "Directors of Business Simplification" or "Directors of Fulfillment."

I'd like you to think about the overall purpose for your job. Essentially, what were you hired to do? What is the general purpose or intent behind the creation of your position? **[Allow participants a few minutes to jot down their ideas.]**

Now, I'd like you to "translate" that purpose into an amusing, creative, fanciful job title for yourself. Considering what you do, what would you like to be known as?

[Take a few moments to have volunteers share their ideas. Encourage the participants to share, especially if they are from the same department or do the same kind of work.]

Quality Concept: Logical Processing Versus Random Guessing

Materials

Paper, pencils, and Observer's Forms for observers.

Arrangements

Participants will work in teams of three or four members each. There will be one observer per team.

Time

Fifteen to twenty minutes.

Objective

To illustrate the need for the application of logic to certain problems.

Mini-Lecture

During this activity, I will ask you to work in small groups. An observer will note how you work together as a team to solve a problem. Let's take a moment now to form the teams and to decide who will be the observer for each team. **[Distribute the Observer's Forms to the observers.]**

Here is the problem: There are eight people in a room. Each person shakes hands with each of the other seven people in the room one time. What is the total number of handshakes? Let me know when you think you have the answer.

[You will have to circulate among the teams quickly as they share their answers with you. It will heighten the challenge of the situation if you say clearly, "No, that's not it" each time a group shares an incorrect answer with you. As soon as one group gives the correct answer (28), stop the activity and ask the observer from that group to describe the steps the team employed to reach success. You may choose to have the winning team explain its answer or else do so yourself. Write the letters A, B, C, D, E, F, G, H on the chart to represent the eight people.]

If Mr. A shakes with Mr. B and Mr. C and Mr. D—that's three handshakes—and also shakes with Ms. E and Ms. F and Ms. G and Ms. H—that's four more—we have a total of seven handshakes so far. **[Draw arrows among the letters to show who is shaking hands with whom.]**

Now it's Mr. B's turn, but he already shook with Mr. A. So, B shakes with Mr. C and Mr. D and Ms. E—that's three—and with Ms. F and Ms. G and Ms. H—that's three more, so we have a total of six for Mr. B.

We come to Mr. C next. But he already shook with Mr. A and Mr. B., so he starts with Mr. D and Ms. E and Ms. F—that's three—and with Ms. G and Ms. H—that's two more. So, we have five handshakes for Mr. C.

[Continue with each and note that the total number for each person is decreasing by one each time. Total the numbers for the answer of 28. You may call on the other observers next to share their analyses of their groups' processes.]

Observer's Form

1. How long did it take before the team members stopped guessing and tried to work on the problem logically?

2. Did anyone assume leadership of the group? If so, to what extent did the group allow this to happen? If not, why not?

3. How efficient was the group?

4. How successful were the members in applying logic?

5. Did anyone ask if anyone in the group had logic or mathematics training? What efforts were made to write down the problem or to analyze it?

What is a Consensus?

The purpose of this session is to bring the problem-solving process from the stage of analysis and discussion to the stage of action. This is the payoff. The real benefit of the team process comes from reaching a decision and taking unified action.

A team can take unified action to improve performance when it has reached a consensus. ***A consensus is the willing acceptance and support of a decision by all members of the team.***

There are two different views of what a consensus is. One view is a *pure* or *ideal* consensus. In ideal consensus, after talking about a problem and considering alternatives, eventually the entire group will become of one mind, with the same understanding. In the view of pure consensus, there is no disagreement when consensus is reached. This is quite common when teams are dealing with routine or simple matters. It is less common when dealing with complex issues, or issues that produce strong feelings on the part of team members. Because the team works together and has most of the same information and perspective, they can often become of one mind on a course of action.

Some writers, particularly those whose primary experience is in academia, argue that the team should continue discussing the issue until it reaches pure consensus. Unfortunately, in the real world of organizational life, decisions must be made whether there is a pure consensus or not. For example, a customer may have called with a complaint and requested that a correction be made. Time is important to the customer. You cannot tell the customer that they must wait until your team reaches a pure consensus! That might require weeks, when the customer needs action in hours. In this case, the team must make their best decision and take action, even if there is no pure consensus.

Instead of a pure consensus, a *practical* consensus must be reached. A practical consensus is one in which there is a majority view and the minority is willing to act in a unified manner because they recognize that the decision meets the needs of the majority of the team and their customers.

Democratic governments operate on this principle. Imagine if congress could not act until everyone was of one mind. No action would ever be taken! Imagine that the President and his cabinet could not decide until everyone was of one mind. This would lead to very poor performance and the group would tend to revert back to autocratic command decision making in their frustration with the "committee-itis," (the inability of a group to take action). Your team has a responsibility to your customers. Therefore, if you cannot reach pure consensus, you may decide to act on the majority view.

In practical consensus, dissent is welcomed, encouraged and supported. Yet, once decision time comes, the group must take action following the majority view.

Consensus exists when the following conditions have been met:

1. All members have been heard fully, frankly and respectfully.

2. All members have been honest in their views and feelings.

3. All views have been considered without prejudice.

4. All relevant information has been shared equally among the group.

5. Members are willing to sacrifice their personal position for the sake of the whole team.

6. Members act as if the decision was their own.

SESSION VII

SESSION 7

TOPIC G

- Communications Personal, Team and Inter Team

Seminar Presentation

1. Listening
2. Assertive Communication
3. Video - Dealing with Difficult People
4. Quality Concept - The Five Whys - pages 55-56
5. Team Meetings - Agenda & Process

Reading Assignment

- Quality Team Problem Solving Seminar & Review - Memory Jogger - pages 9-68

Project Assignment

Quality Concept: The Five Whys

Materials

Paper, pencils, and copies of the Observer's Form.

Arrangements

Participants will work in triads (groups of three members each): a pair in a role-playing situation and a third person to observe.

Time

Approximately fifteen minutes.

Objectives

To introduce the Five-Whys tool for analysis; to discover possible causes of supplier dissatisfaction.

Mini-Lecture

Who are your internal customers? Please write down now the names of all the people to whom you provide a product or a service during the course of a typical workweek. **[Allow a few minutes for this.]**

Now think back over the last several months to all the problems or complaints or difficulties that you have had as far as these customers are concerned. Please remember that we undergo such introspection not to punish ourselves or to blame, but rather to find the source of problems and then to improve processes. On the same sheet of paper, list as specifically as you can all the problems or conflicts or complaints that you have had from your customers—the people who receive the outputs of your work processes. **[Allow time for participants to complete this task.]**

Now please form triads and we will role play, using a valuable TQM tool to dig into the real cause of problems. One of you in the team of three will play himself or herself. Decide now who that will be. **[Pause.]** The second person will be an observer. **[Distribute the Observer's Form to those persons.]** The third person will play the role of your customer.

Now, I'd like those of you who are playing yourselves to disclose, using your notes, the complaint or problem or negative feedback you received about some aspect of the work you do. Do not defend yourself or try to explain *why* it occurred; merely tell your "customer" what the actual problem is.

When you role-play, the "customer" in the group will state the cause of his or her dissatisfaction. You will offer your reason. The customer will ask you "Why?" You will explain. The customer will ask "Why?" a second time. You will explain. The exchange will continue until the customer has asked "Why?" at least five times.

This technique is critical for learning the *real* causes of problems in the workplace. It is not adversarial but, rather, is an analytical tool for going beneath the surface to uncover root causes.

[On completion of the role-play, have the observer share his or her notes with the team members.]

Observer's Form

1. Describe the interaction between the customer and the supplier.

2. How successful were the customer and supplier in learning the real cause of the problem?

3. Did the customer seem overly critical? Did the supplier seem defensive?

4. What suggestions would you make to the customer and supplier for improving their interactions with others in the future?

Quality Concept: Appreciating the Customer

Materials

Paper and pencils.

Arrangements

Participants will work in groups of five or six members each.

Time

Approximately twenty to twenty-five minutes.

Objective

To develop an awareness of the importance of satisfied customers.

Mini-Lecture

Sam Walton, the founder of Wal-Mart, is known for saying that the customer is the only boss because "he can fire everybody in the company from the chairman on down, simply by spending his money somewhere else."

All too often, we forget the power that customers have. Without their endorsement of our product or their satisfaction with our services, we could easily find that our organizational profits are diminished or that our own work performance is impacted negatively.

I'd like you to think about a time when you were treated poorly as a customer. What specific things were said or done? Or what things were *not* said or done that should have been? I, for example, do business at a neighborhood bank, primarily because it is convenient. However, I inevitably have to wait in long lines. The tellers are not as fast as I think they should be. One teller, in particular, never says "Thank you." I am contemplating switching to another bank, one that is not as convenient but which I think has faster service and more courteous tellers. **[Note: You may prefer to supply an anecdote from your own life.]**

Begin to share some negative customer experiences you have had—perhaps with car repair or electronic purchases or even within the workplace. Once everyone in your group has had a chance to share a "horror story," the members of your group will vote on the most horrible horror story. That story then will be shared with the group at large. **[Approximately fifteen minutes for sharing stories and one minute for voting.]**

[When the groups have selected their "most horrible" stories, ask a member from each group to briefly tell that story to the total group. After each group reports, ask a probing question, such as, "What could have been done to make you less angry?" or "How much would it have cost to make you a satisfied customer?"]

SESSION VIII

SESSION 8

TOPIC H

- Quality Team Problem Solving

Seminar Presentation

1. Systematic Problem Solving Process
2. Team Problem Solving Process
3. Fishbone Exercises Quality Development, Fanatics
4. Characteristics of Effective Team and Characteristics of Effective Team Leaders
5. Team Member Assessment

Reading Assignment

- Paradigm Shifts - Miller
- Ten Ingredients for Successful Teams

Project Assignment

- Team Presentation at Session 9

Observer's Form

1. Did the team establish any ground rules? If so, what were they? If not, what effect did the lack of ground rules have on the team's efficiency?

2. Did a leader emerge? Was there a statement of purpose before the group got underway? Was any attempt made to stay on target? To stay within the time limits?

3. In what ways did the team waste time?

4. How did the team members treat one another?

Quality Concept: Fishbone Diagrams

Materials

Flip-chart paper, marking pens, and masking tape.

Arrangements

Participants will work in teams of five or six members each.

Time

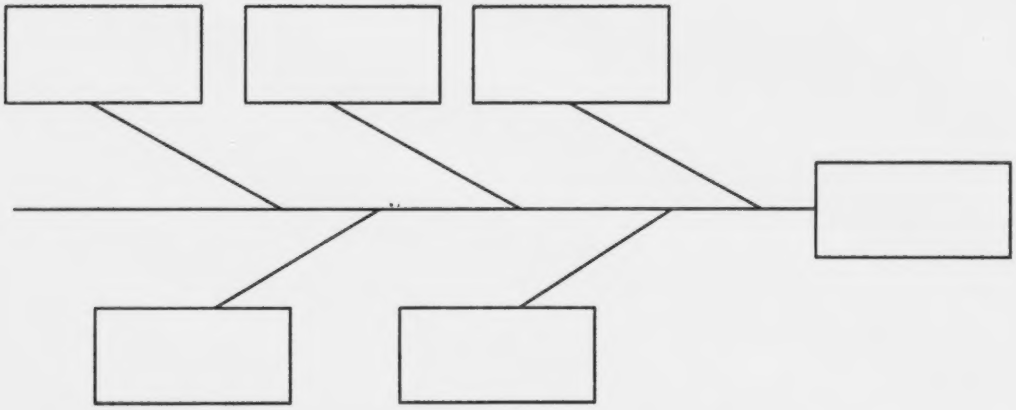
Approximately twenty minutes.

Objectives

To introduce the fishbone diagram; to use it to analyze a work-related problem.

Mini-Lecture

Kaoru Ishikawa (1985) originated the fishbone diagram (so-called because it resembles the skeleton of a fish). This diagram also is referred to as the Ishikawa diagram or as a cause-and-effect diagram. **[Show skeleton of diagram on flip-chart paper.]**



Typical Labels

people
workers
parts
materials
procedure
methods
process
production
machinery
problem
effect

The box to the right of the skeleton contains the *problem* or perceived *effect*. Four or five major causes of the problem or effect are listed in boxes above each of the bone lines leading to the "spine" of the fish. Those causes, in work situations, frequently are listed as "method," "manpower" (or personnel), "material," and "machinery." However, any labels that fit the situation may be used.

I'd like you now to select one work problem that one person in your group is experiencing. Write that problem in the large "effect" box. Beneath each of the categories (e.g., people, parts, method, manpower/personnel, material, machinery, etc.), list as many possible causes as you can in each of those categories.

[This will take about fifteen minutes. Circulate among the groups as they are working, to answer questions or to make suggestions. Post the diagrams as the groups complete them. Conclude with the following.]

This graphic and easy-to-understand listing of possible causes enables teams to identify the causes that most need further investigation.

Quality Concept: Developing Logical/Creative Abilities

Materials

Copies of "Which Side of Your Brain Do You Favor?" and pencils.

Arrangements

Participants will work individually.

Time

Approximately fifteen minutes.

Objectives

To encourage participants to be "lateralized" in their thinking; to draw parallels between the two kinds of thinking and the macro/micro processes in which organizations and individuals engage.

Mini-Lecture

Our brains are divided into halves, each having its own powers. The right side (which controls the left hand) is the center for creative and imaginative functions. The left side of the brain (which controls the right hand) is the center for logic, detail, and planning.

Over the years, each of us has become more comfortable in relying on one side of our brain more than on the other and, as adults, we demonstrate that brain bias—or preference—in our day-to-day problem solving. Clearly, there are advantages to both kinds of thinking. The ideal situation is to be "brain-lateralized," that is, to be able to use either set of skills, depending on the sort of problem or task one is working on. There are exercises that you can engage in to stimulate the brain hemisphere that you are not accustomed to using. These exercises can help you to become unstuck from the hemisphere that typically dominates your thinking. This can move you toward the ideal of lateralization.

For example, to develop your right brain, or creative abilities, you can ask, "What if?" questions, follow hunches, and be playful in your imagining.

To develop your left brain, or logical side, you can set goals for remembering people's names or for task completion within a specified period of time and then work to attain your goals.

Before you can think about which side to develop further, however, you should have some idea of which hemisphere is your dominant one. This activity will tell you which side you probably are depending on.

[Distribute questionnaire forms.]

Quality Concept: Process Fanaticism

Materials

An overhead projector and screen (or suitable viewing surface), a transparency of "FANATICS," flip-chart paper, marking pens, and masking tape.

Arrangements

Participants will work in teams of five or six members each.

Time

Twenty-five minutes.

Objective

To focus thinking on what "process" means.

Mini-Lecture

Philip Crosby, one of the three most famous voices in the TQM chorus, asserts that when people are thoroughly committed to Quality, they become "fanatics" about their work. Crosby (1989) says that such people "leave footprints instead of just dust" (p.104).

[Show transparency.] To become a "fanatic," he says, you must do the following:[2]

F = First, decide that you want a zero-defects strategy.

A = Announce a clear, specific policy.

N = Next, display management commitment through action.

A = Assure that all involved are educated, so they can perform.

T = Then eliminate opportunities to compromise conformance.

I = Insist that every supplier do the same.

C = Convince all involved that they are dependent on one another.

S = Satisfy the customer—first, last, and always.

I'd like you to work in teams now. Each team will write a similar list of TQM ideas, spelling out the word "PROCESS," as Crosby did with the word "FANATICS."

[Give flip-chart paper and marking pens to each group. Allow fifteen minutes for the groups to complete the task. When the groups have finished, post their answers, read each group's list, and solicit comments.]

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[2] Reprinted from *Let's Talk Quality*, by Philip B. Crosby, New York: McGraw-Hill, 1989. Reprinted with permission of Philip B. Crosby.

F = First, decide that you want a zero-defects strategy.

A = Announce a clear, specific policy.

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S = Satisfy the customer—first, last, and always.

1. Advise a subordinate that she has not been chosen for a promotion that she has wanted for a very long time.

2. Tell someone (at a meeting) that his idea is not a very good one.

3. Persuade your boss that you deserve a raise.

4. Your boss has asked for feedback about a presentation she has made. You think that the presentation could have been improved in several ways. What will you say?

5. Persuade your boss to send you to an expensive training seminar.

6. Advise someone who has been with the firm for twenty-one years that you have to lay him off.

Quality Concept: Universal Participation/Employee Empowerment

Materials

Copies of Mr. Toyoda's remarks, paper, pencils, flip-chart paper, and marking pens.

Arrangements

Participants will work individually (or in small groups if they prefer).

Time

Twenty to twenty-five minutes.

Objectives

To make participants aware of the need for employee suggestions; to practice the communication skill of reply.

Mini-Lecture

Eiji Toyoda, chairman of the Toyota Motor Company, has made an interesting observation. It underscores a basic premise of the Quality movement: that the people who do the work know the work best. Thus, if improvements to work processes are to be made, it is critical for supervisors to listen to the suggestions of their subordinates.

In a few minutes, I am going to share his remarks with you. After you have read them and answered a few questions, I will ask you to prepare a letter to Mr. Toyoda, describing for him the effectiveness of the communication process in your organization.

Here are the questions: **[Have these written on flip-chart paper and post them where all participants can see them. Read through the questions aloud.]**

1. **How many suggestions have you made during the last year to improve a work process? What happened to those suggestions?**
2. **What is the policy in your organization regarding response time for suggestions? What percentage of the suggestions made are implemented?**
3. **What happens when a suggestion is accepted?**
4. **What do you think the current attitude in your organization is regarding suggestion programs?**
5. **How do you think the suggestion program could be improved? (If your organization does not have an official suggestion program, how difficult do you think it would be to implement one?)**

Here are Mr. Toyoda's remarks:[2] **[Have this written on flip-chart paper and post it where all participants can see it.]**

"One of the features of the Japanese worker is that they use their brains as well as their hands. Our workers provide 1.5 million suggestions a year, and 95% of them are put to practical use. There is an almost tangible concern for improvement in the air at Toyota."

Jot down your responses to the questions now and then use them to formulate a letter to Mr. Toyoda. The letters will not be sent, but they can serve as good discussion points for future process-improvement team meetings.

[When the participants have prepared their replies, ask for volunteers to share theirs with the total group.]

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[2] Quoted in *Kaizen*, by M. Imai, 1986, page 15.

■ Quality Concept: Precise Communication

Materials

A transparency of communication errors and an overhead projector (*or* the list of errors written on flip-chart paper and masking tape for posting it).

Arrangements

Participants primarily will read and listen.

Time

About five minutes.

Objective

To present a humorous perspective regarding poor communication.

Mini-Lecture

What a difference a word can make! As you will see from the following examples, the wrong word can really impede understanding between people.

Although your communication errors may not be this amusing, they will, nevertheless, cost time and money to correct. They may also cost as far as your professional image is concerned.

[Show transparency of communication errors and read each one aloud.]

Angie was absent from school because she had post mortem depression.

Homer was out of school because he had to be a polar bear at his uncle's funeral.

Jimmy was out because he was playing baseball and he got hurt in the growing part.

Please excuse Tony for being. It was his father's fault.

Susie had loose vowels.

James fell out of a tree and misplaced his hip.

Lucinda had very close veins.

Richard had diarrhea. And his boots leak.

Quality Concept: Verbal Fluidity

Materials

Copies of "Verbal Fluidity," pencils, flip-chart paper, and marking pens.

Arrangements

Participants will work in groups of four or five members each.

Time

Fifteen to twenty minutes.

Objective

To increase verbal fluidity.

Mini-Lecture

If we are to work well in teams, if we are to share our thoughts clearly with one another, if we are to tear down internal barriers to understanding, then we must choose our words carefully. Having a good vocabulary, of course, is one way to improve our ability to choose the right word. Another way is to engage in exercises to develop the skill of thinking quickly and correctly.

I'm about to share with you a work sheet entitled "Verbal Fluidity." It is designed to sharpen your thinking and verbal skills. Here's how it works. There will be four words such as **[write words on flip chart]:**

- purple
- break
- burn
- ache

You will be asked to think of one word that relates to the other four. The word you are looking for may go in *front* of any one of these four words. Or it may be placed *after* any one of the four. Or, it may be part of a *phrase* involving any one of the four.

The answer is "heart"—the Purple Heart, heartbreak, heartburn, and heartache.

Divide now into small groups. As you work in your groups, try to keep your voices down so that you will not disturb the others. Good luck! **[Distribute copies of handout. Allow ten to fifteen minutes for the groups to complete the task, then call time and post the answers.]**

Answers:

1. = fire
2. = stop
3. = sugar
4. = cheese
5. = pole
6. = yard
7. = sun
8. = soda
9. = cap
10. = French

Verbal Fluidity

1. ______________________ fly station fighter forest
2. ______________________ sign go watch truck
3. ______________________ spice beet cane bowl
4. ______________________ Wisconsin cake cottage ball
5. ______________________ flag bean North fishing
6. ______________________ back stick school bird
7. ______________________ light spot stroke shine
8. ______________________ pop scotch jerk cracker
9. ______________________ shower snow gun baseball
10. ______________________ fry horn language cuisine

Quality Concept: Listening

Materials

An anecdote or personal story related to TQM.

Arrangements

Participants will work in the total group.

Time

Five to ten minutes

Objective

To emphasize the importance of listening on two levels.

Mini-Lecture

Particularly in our work with our teams, it is important that we listen carefully to one another and that we give and receive feedback to ensure that we have really heard what we believe we have heard. Sometimes the things that we hear were not even said. Let me give you an example.

[At this point, provide a story from your own experience (if possible, related to quality or TQM). The more dramatic the story the better, the more emotion-laden the better, for it will be the emotions that you *don't* mention that the careful listener will hear. For example, in my listening workshops, I sometimes tell a story—using only the facts—of a time from my childhood when I encouraged my sister Linda to cross the street. Suddenly, I saw a car coming toward her and screamed at her to hurry. But instead of making her run faster, my screams actually paralyzed her with fear. The car struck her. To this day, she walks with a limp. I never mention the word "guilt" or "anger" (the driver was not only drunk and speeding, but he never went to visit her in the hospital). I then ask the participants to restate the facts, which they are able to do fairly well. Next, I ask them if they "heard" anything I did not say. "Guilt" and "anger" are always heard.]

[Then lead a discussion of the importance of being able to listen on two levels—the *deliberative* level, on which facts alone are shared, and the *empathic* level, on which emotions are shared.]

[Option: You may wish to divide the class into pairs afterward to see if one partner can tell a story and if the other partner can listen on two levels. Remind participants of the need to check, however, to ascertain that the things we believe we heard were actually being said or implied. The importance of feedback cannot be minimized.]

of variation fall within managerial control, so we should turn to management for correction. Dr. Deming asserts that management is responsible for 94 percent of quality problems, because it is management that determines the systems.

Problems that result from special causes also need to be corrected. However, because the special causes are not typical of all operations, the correction of the cause may or may not fall within the managerial domain. More often than not, the special cause can be corrected by the individual who is most closely associated with the process. But the special cause must be dealt with so that the process can be brought under control once again.

Dr. Deming has qualitative as well as quantitative emphases in his philosophy. He believes that people are born with a natural desire to be creative and to acquire knowledge. He also believes that intrinsic motivators, not extrinsic ones (such as money), are what bring joy to the workplace.

Some of Dr. Deming's ideas seem startling at first. Other ideas of his—such as the elimination of performance appraisals for employees and the elimination of grades for students—may seem crazy or impossible. You are not expected to agree—at least not initially—with everything you read or hear. However, it is a measure of one's ability to learn and grow that one can agree to keep an open mind, to think *about* thoughts that might have seemed extreme or heretical before.

New Ways of Thinking

In a brochure advertising his seminars, Tom Peters says, "If you have gone a whole week without being disobedient, you are not serving yourself or your company well." This radical encouragement to shift paradigms or think new thoughts was certainly not apparent in the statements of the following individuals, each of whom was regarded as an expert in his own field:

- In 1923, Robert Milikan, physicist and Nobel Prize winner, observed, "Man can never tap the power of the atom."
- In 1905, Grover Cleveland, twenty-second and twenty-fourth President of the United States, asserted, "Sensible women do not want to vote."
- In 1895, Lord Kelvin, president of the Royal Society, declared, "Heavier-than-air flying machines are impossible."
- In 1869, respected physicians told William Semple that his idea for a new food product would exhaust the salivary glands and cause the intestines to stick together. Semple defied their warnings and gave us chewing gum.

To bring about improvement in the standard operating procedure, to continually seek ways to optimize systems, it will be necessary for you to *not* conduct business as usual. Armed with innovative ideas, you should be able to make some changes for the better in the way in which you do your work. Such changes really start when you dare to think the unthinkable. Or, as jazz great Miles Davis expressed it, "Don't do today what you were doing yesterday."

Philip B. Crosby

Crosby has faith, similar to Deming's, in the innate desire of employees to do their jobs well. "Always assume that people are vitally interested in the quality improvement process," he tells us (Caroselli, 1991). "They will act to fulfill your conviction. Assume the best and that is usually what happens" (p.11).

Known world-wide for phrases such as "zero defects," and for slogans such as "Do it right the first time," and "Quality means conformance to requirements," Crosby (1979) also has a fourteen-step plan for improving quality. It is as follows:[2]

1. Make it clear that management is committed to quality.
2. Form quality-improvement teams with representatives from each department.
3. Determine where current and potential quality problems lie.
4. Evaluate the quality awareness and personal concern of all employees.
5. Raise the quality awareness and personal concern of all employees.
6. Take actions to correct problems identified through previous steps.
7. Establish a committee for the zero-defects programs.
8. Train supervisors to actively carry out their parts of the quality-improvement program.
9. Hold a "zero-defects day" to let all employees realize that there has been a change.
10. Encourage individuals to establish improvement goals for themselves and their groups.
11. Encourage employees to communicate to management the obstacles they face in attaining their improvement goals.
12. Recognize and appreciate those who participate.
13. Establish quality councils to communicate on a regular basis.
14. Do it all over again to emphasize that the quality-improvement program never ends.

> "A foolish consistency is the hobgoblin of little minds."
>
> —Ralph Waldo Emerson

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[2] Reprinted from *Quality Is Free*, by Philip B. Crosby, New York: New American Library, 1979. Reprinted with permission of the author.

marketplace. Because of the complexity of today's business problems and the continual change faced by organizations, the resources of all employees must be available when appropriate and necessary. Leaders must be able to rely on the wisdom of the group to solve not just the occasional mind-boggling problem but also the ongoing, day-to-day concerns faced by every organization.

TEN ESSENTIALS OF TEAMWORK

What makes a collection of people become a team? What keeps team members working well together? What do groups need to function productively? A team can be defined as a collection of individuals formed to carry out a set of tasks or to accomplish a goal. Team members have mutually interdependent purposes, so that the success of one team member is contingent on the success of others. In addition, each person has a sense of belonging or membership, and all team members accept certain behaviors based on group norms, procedures, and constraints.

Studies in group dynamics (what goes on among people in group settings) show that teams or groups have certain key needs (see Figure 3). For a team to stay alive and function well, these needs must be met:

Common goals. Members of a team need a reason for being and working together. The goals of a team rationalize its existence. Although the goals may change over time, each member should clearly understand what these goals are at any point. The less clear the goals are, the more likely it is that they will be misinterpreted by team members and the more likely it is that the group will suffer internal tensions, arguments, and cross-purposes. Without clear goals, people become apathetic or use the group to achieve their own personal goals.

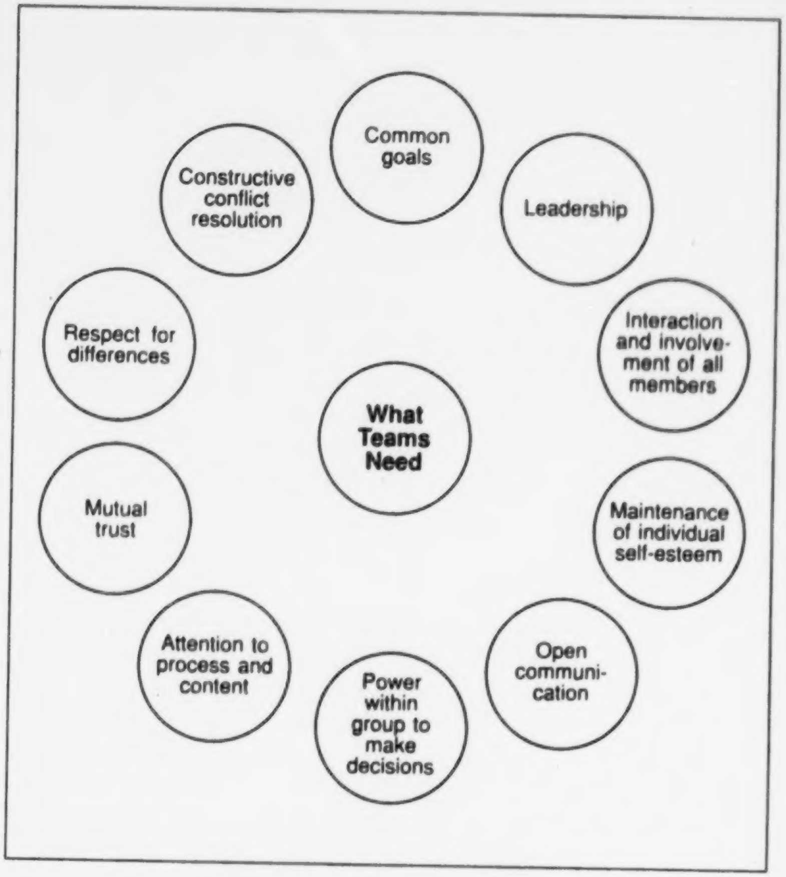

Common goals
Constructive conflict resolution
Leadership
Respect for differences
Interaction and involvement of all members
What Teams Need
Mutual trust
Maintenance of individual self-esteem
Attention to process and content
Open communication
Power within group to make decisions

Figure 3. Key Needs of Teams

Leadership. Teams need leaders and members who can lead when necessary. Whether a group has a formal leader or leadership is shared, the group needs people who are willing to take the risk of leadership. Leaders are the people who are respected and influential enough to get others to listen to them, to get support from reluctant members, and to build bridges with groups and people outside the team. Leaders help coordinate the work of the team, have good communication skills, and know how to get everyone involved.

Interaction and involvement of all members. To achieve synergy and group spirit, all team members must contribute actively. Holding back creates problems for the team. Therefore, it is important for team leaders to know how to get everyone involved.

Maintenance of individual self-esteem. The good of the group should not prevail to the point that members lose self-esteem. Each person's contribution must be heard, valued, and acknowledged. Favoritism must be avoided, and members must be encouraged to be themselves. The challenge to the team and to the leader is to enhance, not lower, the self-esteem of each member.

Open communication. Team members need to feel they can speak their minds, that the channels of communication are open to everyone—especially to the leader. The team should have ample time to communicate; share information; discuss issues; and use informal communication channels to pass on information, make suggestions, and bring up new ideas.

Power within the group to make decisions. The work of the team should center around the things it has the power to influence. Giving teams work to do that does not get approved for implementation is unproductive and demotivating. Some of the failure of early quality circles in this country can be traced to the fact that the suggestions they made were sometimes either ignored or vetoed higher up. These teams were not given the power to carry out the work they were asked to do. If more decisions were made at the level where they were carried out, people would have more reasons to work together in teams.

Attention to both process and content. For people to function well together as a group, attention must be paid both to the process used to do the work and to the content of the work or the group's task. Process includes attention to how

people get along together, how the work is structured and distributed, and what the general rules of working together are. Usually, the task to be done gets a lot of attention, while the process of how the team members work together is expected to fall into place. Because process problems may hurt feelings and impede progress, it is best to address the team's process along with its tasks.

Mutual trust. Trust depends on how the leader and members treat one another. When something happens to break that trust (a commitment not met, a confidentiality betrayed, dishonesty), it can be difficult to retrieve. Members and the team leader may need to discuss how their behaviors and attitudes affect trust. Then everyone will need to try to do those things that will build and maintain trust.

Respect for differences. Team members need to feel they can disagree and be different from others without being punished. The leader sets the tone, but each member has to take responsibility for acknowledging and respecting the needs of others. When individuals on a team are not getting some of their needs met, teamwork becomes demotivating for them.

Constructive conflict resolution. Conflict is natural. When it surfaces, it must be addressed in a healthy way. Again, the leader plays an important role in getting group members to express conflict and come to general agreement. Unresolved conflict leads to less-than-adequate performance, resentments, and lack of motivation.

TASK AND SOCIAL DIMENSIONS OF TEAMWORK

Teamwork has two dimensions: task and social. These two dimensions are inseparable, for without either, teamwork does not exist. The task dimension refers to the work that team members are to perform—the jobs they have to do and how they are going to do those jobs. The social dimension refers to how team members feel toward one another and their membership on the team. At any given point in the team's work, both the task and social dimensions operate. When team members make a decision and develop ideas, they are simultaneously developing ways to get along together.

Team leaders benefit by addressing regularly both the social and task needs of their teams. To the extent the team does its tasks well, it will be productive. To the extent it manages its relationships well, team members will have a sense of belonging and commitment.

PRESERVING THE DIGNITY OF THE INDIVIDUAL

Leaders will do well to think of a team as a collection of diverse individuals, each with his or her own unique character and potential for contribution to the group. Being expected to conform and to subjugate individual needs and desires for the common good is degrading to team members. The fact is that some people are more comfortable as part of a group than others. Some more independent members may feel constrained and ill at ease working in a team. Others, because of their race, sex, age, religion, or culture, may not have much in common with other members and yet feel pressured to get along and conform. An effective leader is sensitive to the need to preserve individual dignity, to capitalize on differences, and to not try to achieve conformity.

A facilitative leader views teamwork as an ongoing negotiation among diverse individuals who are all working toward common goals. The skills of facilitation help leaders blend different views into consensus so the team can achieve its goals. The effective team leader acknowledges individual differences and challenges the team to meet as many individual needs as possible while achieving the team's goals.

4

Making the Transition from Controlling to Facilitating

BASIC PRINCIPLES FOR INITIATING CHANGE

Moving from a controlling to a facilitative style means change: changes in mind-set and leadership style, changes in the way leaders relate to their followers and followers relate to leaders, changes in the way work gets done, changes in the types of behavior and performance that are rewarded, and changes in the way team members relate to one another. There is no easy way to tackle all of these changes at once, nor will the transition be a smooth one.

Leaders who are making the transition to a more facilitative approach will do well to remember three principles of change:

- Change takes *time*.
- Change is a *process*, not a decision.
- Change requires plenty of *experience and practice* in the new way of doing things.

Leaders seeking change must acknowledge the vast effort it takes and must not give up when it takes more time and practice than anticipated. Change is not on a switch, like a light that goes on and off, but is a process—sometimes a very long one. Leaders who effectively implement change make sure that their teams have plenty of opportunities to practice new ways of doing things while they go about their day-today activities.

Here are some additional principles that will help leaders make the transition to facilitation:

- Make one or two changes at a time. Do not tackle everything at once.
- Allow time for change to take place. Change is never easy, and people need time to learn new ways of working together.
- Reward people's efforts to change; otherwise, they will not change.
- Keep the goal in mind. The goal is not to have a team but to increase productivity and employee satisfaction.
- Accomplish something daily toward the goal. Do not let time go by without moving in the desired direction.
- Use planning and regular evaluation of progress as tools to move toward the goal.
- Have patience with people. Change is difficult and even threatening for some.
- Do not play God. Be realistic but positive about what you can accomplish given your company's culture and the constraints placed on you. Acknowledge that you cannot change the organization alone, and plan accordingly.

Perhaps you want to make some changes in your leadership style but still have a nagging question: "Where do I start?" You may feel overwhelmed by the number of things you want to change or not understand how to apply the ideas presented here to your own situation.

Here is a suggested process for making the transition from a controlling style of leadership to a more facilitative one. First, while reading this book, list the things you would like to change in the way your team or group works together or in ho[illegible]ou lead the group. Think in terms of making

these improvements over many months to several years. Second, ask yourself what strengths, support systems, and other resources you already have that can help you make these improvements. Plan to use these strengths to your advantage when you begin to make changes. Third, break these big changes down into small steps. If you want to start listening more to people, for example, write down the actions you can take to accomplish this goal. For example:

- Ask at least three questions of subordinates this week. Then make an effort to listen without interrupting.
- Take a course in listening.
- Ask a friend or significant other to tell you when you interrupt and when you appear to demonstrate good listening skills.

WHAT TO EXPECT

People resist change, even when it is for the better. Change disrupts people's lives, challenges their beliefs about themselves and their world, and creates confusion and disorientation. Therefore, do not expect others to welcome the "new you" or to be supportive, even when you believe you are acting this way for their benefit. In fact, you may find subordinates and followers almost antagonistic at first, even when you begin to listen more and ask for their input.

Why does this happen? When you begin to draw people out and listen to them, they may distrust you at first. They will be wary, watching for your reactions. They may simply avoid saying anything, afraid that what they say may be used against them. Unless you have been a good listener in the past, they may not be used to expressing their feelings and ideas to you.

Another typical reaction is that people will, when finally asked how they feel and think, vent many of their frustrations all at once. They will take the opportunity [illegible]alk about everything they do not like. This deluge of negativity may be difficult to deal with. But the way to handle it is to listen and take notes. Ask people for clarification or examples when they are vague, so you can more fully understand the extent of their complaints. Demonstrate your ability to listen without sermonizing and without judgment or bias. Try not to become defensive. Avoid making promises. You may explain that you are listening so you can begin to see ways to involve them more in planning and decision making, that you will be trying to help them solve some of these problems in the future.

HOW TO L.E.A.D.

Leaders can use a simple four-step model to ensure employee participation and increase productivity:

Lead with a clear purpose.

Empower to participate.

Aim for consensus.

Direct the process.

This L.E.A.D. model includes key leadership functions: setting clear goals and objectives, getting people involved, reaching consensus on important items, and paying attention to both tasks (the work) and relationships (the team).

Using this model ensures that the ten essentials of teamwork are met. Paying attention to all four parts of the model provides the *leadership* that any team needs. Leading with a clear purpose meets the need for *common goals*. Empowering members to participate achieves the high level of *interaction and involvement* that group members need. Participation and consensus help maintain *individual self-esteem* and encourage *open communication*. Participation and consensus also help build *mutual trust* and achieve a healthy *respect for differences among team members*, while providing an avenue for *constructive conflict resolution*. Using all four parts of the model will assure that there is *power within the group to make decisions*. Leading with a clear purpose and directing the process ensure that leaders pay *attention to both process and content*.

The following paragraphs offer a more detailed analysis of this L.E.A.D. model.

Lead with a Clear Purpose

To lead with a clear purpose simply means to use goals as a motivator for teams. For goals to motivate people, they need to be challenging, positive, and realistic. A leader can give power and focus to the team's goals in several ways.

First, set realistic, team-oriented goals that tie to the company's goals. Team-oriented goals are ones that apply specifically to your team. They are the things your team needs to accomplish to support the larger company goals. The company's goals are not immediate enough to motivate your team. You need to help your team identify specific goals that it alone can accomplish. Make sure they support the company goals.

Next, publish those goals. Make them visible for all to see. Do not expect people to remember them if they are not discussed and referred to often. Do not bury them in occasional memos and documents. Instead, post them in meeting rooms on flip charts or posters; use stickers or other visual reminders to keep the goals in front of everyone. Refer to the goals often in memos, presentations, and meetings. Whenever possible, use the goals to guide a decision. Ask others to do the same. When someone comes to you with a problem or suggestion, say, "In light of our goal of 95 percent on-time deliveries, what do you think is the best solution?"

Work with your team to identify milestones that will show you are making progress toward your goals. Keep these subgoals in front of your people, with deadlines whenever possible. For example, you might have these milestones for the goal of achieving 95 percent on-time delivery:

- 85 percent by the end of the third quarter;
- 90 percent by the end of the fourth quarter;
- 93 percent by the end of the first quarter of next year; and
- 95 percent by the end of the second quarter of next year.

Track and report the team's progress in achieving its established goals. When a milestone is achieved, acknowledge it and celebrate it. Take a little time out to feel good about meeting a goal. Over time, allow your team to set its own goals, monitor its own progress, and plan its own celebrations.

Empower to Participate

Once goals have been established and published, your next step is to empower people to participate in achieving those goals. The word "empower" means to give power or authority, to authorize, to enable or permit. Thus it means you can begin to facilitate, to get others to determine how goals will be achieved. Even though the goals themselves may motivate the team, team members become unmotivated if they cannot participate in important decisions regarding ways to achieve those goals—especially if they are expected to carry out those decisions.

Not everyone needs to participate in every decision, but people should participate in those decisions they will have to implement. "Who will we depend on to carry out this decision?" is the key question here. Those people should at least be consulted about the decision that is made. Some decisions may naturally fall to one or two team members. Others will need to be made by the entire team. Still others may require the representation of others outside the team.

As a leader, you have at least two choices when it comes to involving your team in making a decision. One is simply

to consult with team members and then make the decision yourself. Alternatively, you can work with others (one, a few, or the whole group) to come to a consensus about the decision. When a consensus decision is made, you have the option of remaining neutral and simply facilitating the decision process or becoming a member of the group making the decision. The role you choose depends on several factors, such as your comfort with letting the group decide, your ability to avoid overinfluencing the group's decision, how much you have to be involved in implementation, and whether team members want your involvement.

You have many other ways to empower people to participate. You can, of course, involve the team in setting its own goals. You may decide to redesign jobs and procedures so team members will have to interact to get work done. You can identify which types of decisions you will make and which types of decisions the team or team members will make.

One of the main principles of facilitation is to get others to solve problems they are capable of solving. You can encourage more involvement by learning techniques to get others to solve their own problems. These techniques are covered in later chapters: Chapter 5 deals with getting someone to solve his or her own problem; Chapters 6 through 12 deal with getting groups to solve problems.

Facilitative leaders encourage participation by listening more than talking and by asking more than telling. Two skills are therefore critical for good facilitators: listening and asking questions. Listening, or *active listening*, is required to hear, really hear, what the other person is saying. Active listening requires that you observe the other person as well as hear his or her words. The other person's body language, tone of voice, eye contact, and other signals will give you additional information about how that person perceives the issue. Active listening requires that your own body language indicate your receptiveness to the other person; maintaining an open posture, nodding your head, being still, keeping eye contact—all these and more show that you are paying attention. Active listening also means not being distracted by others, by the surrounding environment, or by difficulties the speaker may have in getting his or her message across. It means not thinking about what you are going to say while the other person is talking. It also means that instead of jumping ahead to judge the other person or figure out why his or her remarks are not valid, you must postpone judgment until you have heard that person out. (Chapter 5 presents more on active listening.)

Unfortunately, sometimes we are a bit lazy or too preoccupied to listen. We may be pressured with other issues. We may be feeling down or defensive or have a hard time being patient while the other person talks. We may wish we were somewhere else. Or we may misunderstand the other person. Here is where another aspect of active listening comes into play. In addition to knowing how to listen, we need to know when to ask questions or clarify what the other person has been saying. We can repeat a brief version of what we thought was said, or *paraphrase,* to check out the accuracy of our interpretation. Or we may ask the person to give us more information or help clear up our confusion. Generally it is best to give the other person a chance to talk, to formulate his or her thoughts, and to finish what he or she wants to say before jumping in with questions. Such patience is a rare commodity in a busy, pressured, rapidly changing world; but it is nonetheless a highly important trait for good listeners—and especially for good leaders.

Another way to empower team members is to regularly seek their ideas, opinions, and reactions without judging or punishing them for what they say. This is in fact a very simple habit to get into, but it is often overlooked. Leaders are often busy people, and some do not get a lot of opportunity

to interact with their people. A good leader-facilitator, however, will make time to seek others' opinions and ideas, even if only for a few minutes in the hall. Stopping by a person's office for the sole purpose of getting his or her opinion is particularly empowering for that person. You might say something like "Jan, I'm interested in your opinion of the Blair account. What do you think we should do to improve that situation?"

Once you have asked someone else's opinion, the next few steps are critical. You must:

1. Listen actively.
2. Ask questions or paraphrase to clarify what was said.
3. Thank the person, and *resist having the last word.*

Sometimes you will be tempted to offer your opinion (especially if the other person asks for it). But remember that one of the best ways you can empower others to speak up is to listen without having the final word. Staying neutral for a while frees others to express their true opinions. Because you are the leader, your opinion can sway others. If you really want to hear what others think, let them talk without trying to influence them or being defensive.

Another empowering technique is to avoid letting others rely on you for answers. Instead, when someone comes to you for an answer or decision, ask what he or she thinks. Using this technique does not mean you do not have an opinion or are abdicating your leadership role. It means you are encouraging others to solve their own problems. You are giving them permission—empowering them—to take on some of the leadership role.

Leaders who empower their teams to make decisions must then support those decisions. If you must help implement the decision, then you should be involved in the decision-making process along with everyone else. But even if you do not need to be involved, you still need to support your team once the decision is made. Support comes in many forms: having a positive attitude, offering your assistance, running interference, explaining to your superiors what your team is doing, and giving encouragement.

Another way to encourage participation is to give the team regular opportunities (probably at team meetings) to assess itself. You are not the only one to measure the team's performance. Teach the team members how to measure their own performance. When assessing itself, the team should cover both how well it is achieving its goals and how well it is doing as a team. Are good relationships being built among team members? Is there a spirit of cooperation? Are members working out differences in acceptable ways? What team norms (ground rules) are working? What norms need to be changed or added?

Finally, become proficient at giving genuinely positive reinforcement to your team members. Watch for things they are doing well, and let them know that you appreciate what they have done. Here are some general principles to follow when giving praise:

- Be specific about what you are praising.
- Be timely; do not wait too long after the event or behavior.
- Keep the praise separate from problems or negative concerns; it may get lost if it is sandwiched between problems.
- Give praise regularly but not so often that it becomes expected or meaningless.

Aim for Consensus

The third step in the L.E.A.D. model, aim for consensus, means helping people move toward general agreement. Foster consensus throughout the process of working with others, not just as a final step. Expect conflicts, but treat them as natural and work through them. Your role in building consensus is to bring as many ideas, opinions, and conflicts to the surface as possible and then to get people to find the approach that best meets the needs of the organization and individual team members.

After getting general agreement, it is your responsibility to act on the decision or to empower the group to act on it. You may use the group's input to make a decision yourself, or you may let the group's decision stand.

Direct the Process

The last step in the L.E.A.D. model, direct the process, requires experience in working with groups and knowledge about the group process. An effective leader will use various techniques, many discussed in the following chapters, to help the group get its work done.

CONCLUSION

Figure 4 (see page 54) lists the important group needs met during each step of the L.E.A.D. model and lists key tasks that must be performed by the leader and by team members. The L.E.A.D. model provides ample opportunity for employees to take part in the management of their organizations and gives leaders a critical role to play in making this happen.

Leader Functions	Group Needs Met	Leader Tasks	Team-Member Tasks
Lead with a clear purpose	· Common goals · Attention to content · Leadership	· Set boundaries · Interpret company goals · Facilitate team's setting of its own goals · Evaluate and track progress toward goals	· Ask questions to test own understanding · Participate in setting goals for team · Help leader track and evaluate progress toward goals
Empower to participate	· High level of involvement of all members · Maintenance of self-esteem · Leadership · Respect for differences · Trust	· Ask questions · Listen · Show understanding · Summarize · Seek divergent viewpoints · Record ideas	· Contribute ideas from own experience and knowledge · Listen to others · Build on others' ideas · Consider others' ideas · Ask questions · Think creatively
Aim for consensus	· Constructive conflict resolution · Power within group to make decisions · Leadership · Trust	· Use group-process techniques (brainstorming, problem solving, prioritization, etc.) · Ask questions · Listen · Seek common interests · Summarize · Confront in constructive way	· Focus on common interests and goals · Listen to and consider others' ideas · Make own needs known · Disagree in constructive way
Direct the process	· Attention to process · Leadership · Trust	· Give clear directions · Intervene to keep group on track · Read group and adjust · Remain neutral · Suggest alternate processes to help group achieve goal	· Listen · Keep purpose in mind · Stay focused on objective · Use own energy and enthusiasm to help process along

Figure 4. Using the L.E.A.D. Model

5

Facilitating One-on-One Meetings

PURPOSES OF ONE-ON-ONE MEETINGS

Meetings between the leader and one other group member serve several key purposes. They keep the leader in touch with what is going on with each person on the team. They provide the leader an opportunity to give positive feedback, to confront problems early on, and to work collaboratively with individuals. One of the most important purposes is to give the leader a chance to show interest and concern for each person. Important work also gets done in one-on-one meetings, such as setting goals, solving problems, making decisions, bringing problems or concerns to the surface, providing support, giving feedback on progress, and building consensus.

One-on-one meetings are for issues that concern the leader and one other individual. Whenever possible, these issues should be addressed as they arise. Then, when the team members are together, they will not have unsolved individual problems to deal with.

This chapter deals with three facilitator techniques that are particularly useful in one-on-one meetings:

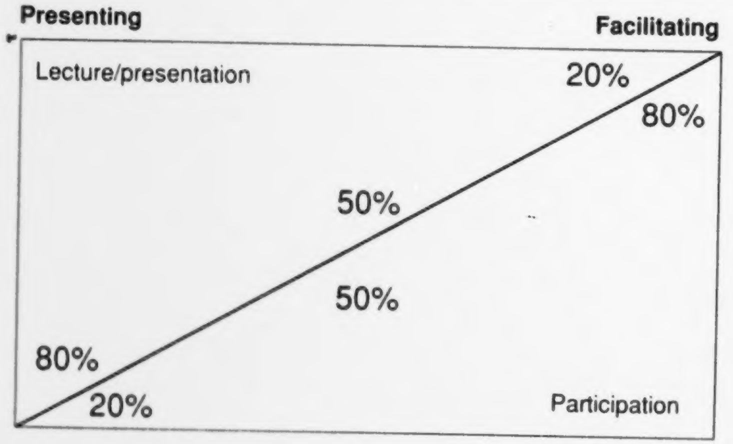
- Consensus building;
- Problem solving; and

Indicate after each item below whether it represents the *content* or the *process* of a meeting:

	Content	Process
1. Statement of the problem	____	____
2. Group discussion of the problem	____	____
3. Information on a new procedure	____	____
4. Progress report	____	____
5. Breaking out into small groups to discuss the advantages and disadvantages of a suggested procedure	____	____
6. Idea contributed by one of the normally quieter group members	____	____
7. Several side conversations going on at once	____	____
8. Flip charts posted around the room with ideas the group generated		
a. The flip charts	____	____
b. The ideas	____	____
9. Three alternatives to organizing a staff	____	____
10. Brainstorming session	____	____

Note: Answers appear at the end of this chapter, on page 88.

igure 5. Quiz on Process Versus Content



Presentation style:
- Mostly one-way communication
- Presentation format
- Tell-and-sell approach
- Ideas presented and defended
- Suitable for passing on information
- Limits on group creativity

Facilitation style:
- Multiple-way communication
- Participation format
- Problem-solving approach
- Ideas generated by group members
- Suitable for productive group work
- Maximization of group creativity

Figure 6. Presenting Versus Facilitating: Leadership Styles

group members participate very little. In facilitated meetings, the leader does little of the talking and group members participate most of the time.

The presenting style is a form of one-way communication, in which information is passed from the meeting leader to those attending the meeting. This type of meeting can be useful if the goal is to tell, sell, advocate, explain, inform, or announce. But some people question whether this type of meeting should be held at all. Information can be passed on through the written word, making a meeting unnecessary. As Daniels (1986, p. 3) says, "The pure information dissemination meeting, held at regular periods during the work life of an organization, has one guaranteed result: boredom!" He recommends first and foremost that management "do everything possible to diminish the time spent in pure information dissemination. Getting people together solely for this purpose is to ask for failure" (p. 3).

Daniels has a second recommendation:

> Give the group work to do. The underlying assumption in calling any good meeting is that people are being brought together to do what groups do best: employ their members' minds in processing information for the purpose of problem solving, decision making, or planning. Information processed for these purposes is useful—never boring—and the process of using it is one of discovery and exhilaration. (p. 3)

In contrast to the presentation, the facilitated meeting requires the involvement of group members. The reasons for this type of meeting are to listen, discover, uncover or solve problems, decide, create, and plan. A facilitated meeting could also be called a working session, where tasks are tackled and results are achieved.

A leader's style of running meetings can fall anywhere along the presentation-facilitation continuum. However, too many meetings lean toward the presentation side of the continuum, and too few fall into the facilitation category. The best style is the one that suits the purpose of the meeting. If the purpose of the meeting is simply to inform the group and answer questions, the presentation style is adequate. If, however, a great deal of input from group members is needed and ongoing commitment is important, a facilitating approach works best (see Figure 7).

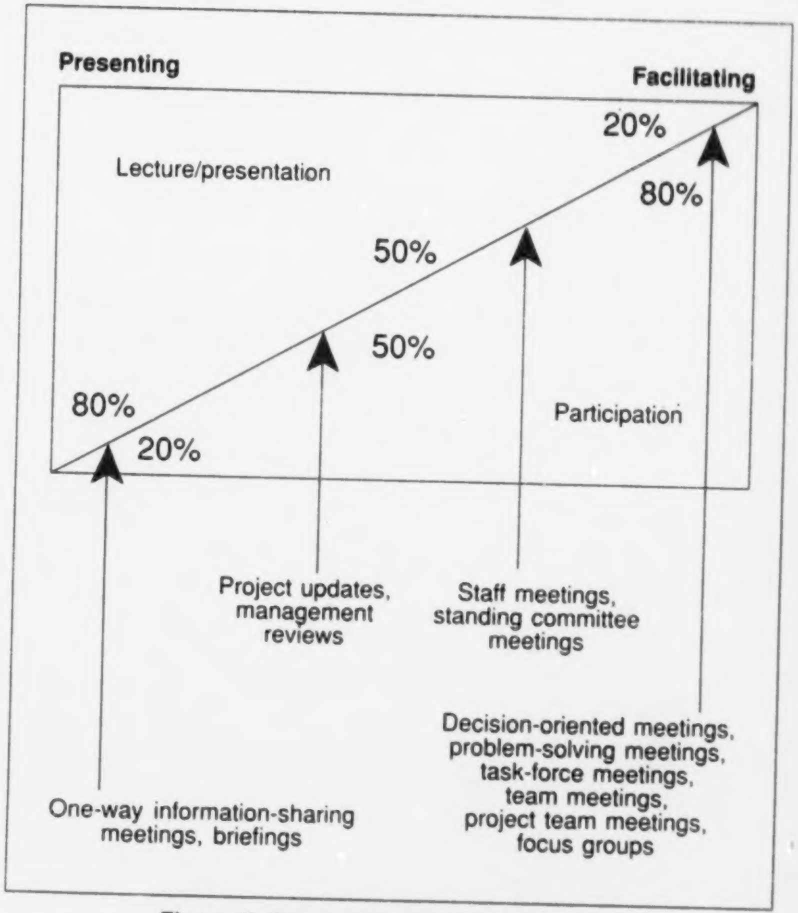

Presenting
Facilitating
Lecture/presentation
20%
80%
50%
50%
80%
20%
Participation
Project updates, management reviews
Staff meetings, standing committee meetings
Decision-oriented meetings, problem-solving meetings, task-force meetings, team meetings, project team meetings, focus groups
One-way information-sharing meetings, briefings

Figure 7. Presenting Versus Facilitating: Types of Meetings

The meeting leader's responsibility for the content and outcome of the meeting is greater on the presentation side of the continuum than on the facilitation side. On the facilitation side, group members share responsibility for the meeting outcome. The facilitator, however, is neutral on the outcome of the meeting—although he or she takes great responsibility for the meeting process. Therefore, moving along the continuum from presentation to facilitation is sometimes difficult. Managers and group leaders often have a vested interest in the content of the meeting and have trouble remaining neutral.

ROLE OF THE MEETING FACILITATOR

A facilitator serves as a guide or a catalyst to help the group get its work done. The facilitator seeks not to give an opinion on the meeting *content* but simply to direct the *process* so the best work of the group gets done. The facilitator provides the method and structure for a group to focus its energy and creativity on a particular task.

Doyle and Straus (1976) describe the facilitator as "the neutral servant of the group." They explain that a facilitator is different from a mediator. Although the role of the facilitator is similar to the neutral, third-party role of mediators and arbitrators, there is a major difference: Mediators and arbitrators get involved in the content of a dispute. Doyle and Straus explain the difference in this way:

> The mediator acts like a diplomat, running back and forth between the two parties and making suggestions about what the final resolution should be. The arbitrator has power to act like a judge, and after listening to both sides, make a final decision. A facilitator remains detached and therefore more unbiased and neutral. He or she does not get involved in the content of the problem, but only in making suggestions about ways to reach solutions.... Even though the facilitator may have personal opinions about an issue, these opinions are not expressed (or allowed to interfere), which is why it's much easier to get all parties to agree to a facilitator than to a mediator or arbitrator. (pp. 80-81)[8]

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[8] From *How to Make Meetings Work* by M. Doyle and D. Straus, 1976, New York: Jove Books. Reprinted by permission.

A facilitator must have knowledge of group processes and make certain that meeting participants are using the most efficient methods for accomplishing their task. When it comes to the content of the meeting, the facilitator remains nonevaluative.

Doyle and Straus describe the facilitator as a traffic cop directing the meeting's process. The facilitator provides rules or norms for the group and then monitors the group so it does not violate those norms. For example, if a group is brainstorming ideas to solve a problem, the facilitator may instruct the group that all ideas will be recorded and considered and that, in the initial stages of the brainstorming process, no one is to evaluate or discount any of the ideas. If someone tries to evaluate or discount an idea, the facilitator intervenes to remind the group of the rules.

A group that is used to being facilitated will begin to suggest its own processes and will police itself somewhat. However, groups that are new to facilitation need to be reminded from time to time about how to proceed.

One exception to the "rule" of remaining neutral on content is when a facilitator is conducting a training program or passing on important information. In these cases, the facilitator may play a dual role: content expert (presenter) and process expert (facilitator). A skilled trainer learns when to teach, or be the content expert, and when to step back and simply facilitate a discussion or group exercise. The facilitator-trainer judiciously chooses when to encourage the group to discover, discuss, and decide on its own. A facilitator-trainer can actually lead a training session without being the content expert, as long as there is someone present who can be a content resource.

There is really no right way to facilitate, no prescribed facilitator approach or style. Much depends on the facilitator's personality, the situation, the nature of individuals in the group, and certainly the dynamics of that particular combination of people. No two facilitations are alike, since the very *place a higher value on the knowledge and experience of all group members.* Gordon (1977) suggests:

> *Effective leaders must behave in such a way that they come to be perceived almost as another group member; at the same time they must help all group members feel as free as the leader to make contributions and perform needed functions in the group.* (pp. 42-43)[4]

The new leader-facilitator focuses on creating a workplace that encourages everyone to take responsibility for the success of the company. The manager becomes a partner with employees, and employees take on a partnership role with management. Managers encourage decision making at lower levels, and employees are asked to assume bigger responsibilities. There is less of a "we-they" approach to managing and more of a synergy between management and employees. To a leader-facilitator, the group is a synergistic body of diverse and valuable knowledge and experience.

CONTROLLING VERSUS FACILITATING

Understanding the role of the new leader-facilitator is easier if we look at leadership on a continuum. At one end of the continuum is the autocratic, controlling leader; at the other end is the facilitative leader. A leader's position along this continuum depends on how much he or she shares the responsibility for decision making with subordinates.

The functions and behaviors of the controlling leader differ greatly from those of the facilitative leader (see Figure 2). On the controlling side of the continuum, the leader retains full responsibility for the work and decisions of the

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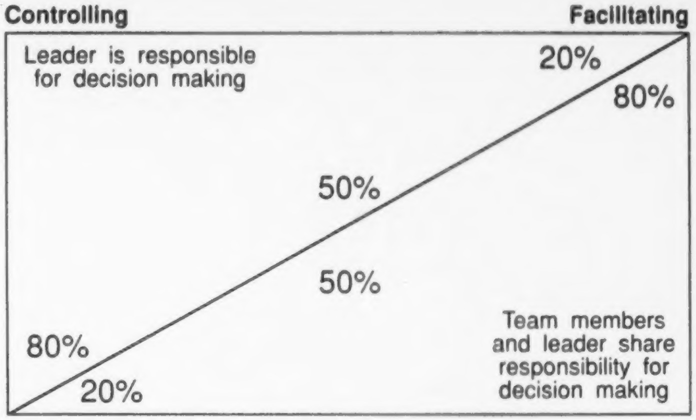
[4] From *Leader Effectiveness Training (L.E.T.): The No-Lose Way to Release the Productive Potential of People* by T. Gordon, 1977, Ridgefield, CT: Wyden. Reprinted by permission.


Controlling
Facilitating
Leader is responsible for decision making
20%
80%
50%
50%
80%
20%
Team members and leader share responsibility for decision making

Controlling leader's role:	**Facilitating leader's role:**
- Tell	- Listen
- Sell	- Ask questions
- Direct	- Direct group process
- Decide	- Coach
- Delegate	- Teach
- Solve problems	- Build consensus
- Set goals	- Share in goal setting
- Use authority to get things done	- Share in decision making
	- Empower others to get things done

Figure 2. Controlling Versus Facilitating Styles of Leadership

team. On the facilitating side of the continuum, the leade shares that responsibility with team members. The controllin leader tells, sells, directs, decides, delegates, solves problems and rewards people. He or she tries to control the work an the output of the team. The facilitating leader listens, em

SESSION IX

SESSION 9

TOPIC I

- Implementation of Successful Team Building Projects

Seminar Presentations

1. Team Presentations
2. Paradigm Shifts - Miller
3. Successful Teams
4. Evaluation
5. Appendice - Deeming, Juran, Baldridge, QIP
6. Lesson from Nature

"Team work is a journey not a destination."

The New Manager

The shift in the nature of work, organization and management is global and eventually will effect every organization and job. There can be no going back. There may be hesitation and momentary setbacks, but it will never be the same. The managers role is changing forever.

The team process, as you now know, requires a redefinition of management responsibility. The supervisor of old, checking up on the performance of his workers, making all of the decisions regarding the work group, cannot continue.

The requirement for change on the part of management raises fears about job security and the new role managers are to play. This chapter is intended to help you consider alternative roles and responsibilities for managers.

There will always be a need for managers. Teams will become increasingly self-managing. However, they will still require coordination, leadership and technical expertise.

One way to understand the new role of managers is to consider the shift from nonvalue-adding effort to value-adding effort. If the supervisor is simply observing the work of others, he is not adding value to the work. On the other hand, if he is working on improving a technical process that can make the team's work more effective, he is adding value. By the account of supervisors themselves, as much as 50% of their time is spent in activities that add no value to the customer or the product.

Our supervisors and managers are the most competent, capable and motivated individuals in the organization. That is why they were promoted to these positions. It is a waste to employ them in ways that are not value-adding. There is nothing wrong with the motivation of these individuals. There is something wrong with the system.

The system, the designed function of jobs, must be reconsidered and all jobs defined in a way that utilizes the resource, the talent of the individuals, in a value-adding manner.

A Brief History of Organization

Our organizations are the result of a cultural history, a natural progression from the organization of the cave, the family, the tribe, the clan, the military organization, the church, and the king, to democratic parliaments and presidents. All of these precedents influence our thinking and our habits.

The imperative to change, however, has become more dramatic as we are pressed by the "future shock" of a global competitive economy. Organizations, roles and responsibilities, are changing because the forces that determine competitive advantage are changing.

The Age of Property

For most of human history, people have subsisted on hunting, fishing and farming. All of these required the control of property. The more property, the more wealth and power. The organization of the cave, family, tribe, etc., were all based on the need to protect and manage property. The military organization was designed to protect property.

The military organization was designed to function in a crisis environment. Command decision making was the primary method and strict chain of command preserved order in battle. Our models and heroes were all military. Their style permeated every organization for most of our life on this planet. Only recently has it begun to change.

The Age of Capital

Rockefellers, Morgans, Carenegies and Goulds had the money to build the railroads, explore for oil, and control corporations and

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politics. During the 1800's, capital was the key factor in capturing competitive advantage.

During this age, the military model was taken into the factory as the factory changed from a small craft shop to an integrated system of mass production. We had supervisors replacing sergeants, and the requirement of conformity was supported by the chain of command in the production organization. The development of specialized functions, specialized organizations and multiple levels of management emerged.

The Age of Technology

With technological breakthroughs such as the automobile, the harnessing of electricity and electronic appliances, and the development of information processing machines, the focus of competition shifted from money to technology. The faster the pace of technological change, a process that was based more on human inventiveness than capital spending, the less important the dominance of banks and banking families.

Now there was the need for entrepreneurs to invent and Thomas Edison created the light bulb, the mimeograph machine, the electric locomotive and 1000 other patents. He did it without great capital. Capital followed the ideas. General Electric and the Edison Companies were formed along with the telephone companies and hundreds of other technology-based companies. The rise of IBM was the crowning event of the technological age.

In the technological age, the role of the manager shifted. There were increasing numbers of specialists. Information systems specialists, process engineers, specialized purchasing, quality control and other functions. However, the chain of command remained relatively unchanged.

The role of first-level supervisor became more difficult. Employees knew more, often having greater skills than their manager. Employees had greater expectations. They expected to have a voice, to be able to make changes, to have their needs met for job satisfaction, as well as receive compensation for their work.

The Age of Competence and Commitment

The element of competition that does not flow easily from company to company, the scarce element in business today, is human competence and commitment. Examine any competition, one company rising while another falls, and you will see that the key factor is human competence.

Sam Walton and Wal-Mart began with fewer material resources and no new technology, but is winning market share against Sears, J.C. Penney's and K-Mart. The only advantage they have is with their people.

Apple and Compaq have captured market share from IBM for the same reason. Honda, Toyota and Nissan have gained market share from U.S. auto companies for the same reason. Delta Airlines, with the "family feeling" motto, consistently beat Eastern Airlines, the airline of the "family feud."

Now, the role of the manager must meet new requirements. Now the primary requirement of management is to develop and channel human competence. The management process must increase competence and commitment. The old chain of command and command decision making suppress the development of competence at the first level of the organization, where the real work is done.

The role of the manager must be that of developing people, encouraging innovation, reinforcing improvement, helping to adapt to change, and managing boundaries between teams of individuals.

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12 Paradigm Shifts & The Managers New Role

Another way to understand the new manager's role is to consider the following 12 paradigm shifts. These paradigms demonstrate the swift change in thinking and behavior that world-class organizations have made. Each of these shifts implies new priorities for the manager.

1. Control Management to Commitment Management

The culture of our organizations is changing because the nature of work and workers is changing. In the past, work was controllable. On the assembly line, jobs were repetitive and required little thought. Performance could be measured simply and reward and punishment administered to provide control. The manager was the person who counted, controlled, and determined reward and punishment.

Today however, the critical performance is thinking about better ways to get the job done, initiating action to improve, and creating new products, services or methods. These are not so easily "controlled." They require innovative thinking, risk-taking and autonomy.

The manager must give up control to those who have their hands on the work. High control increases fear and reduces risk taking, initiative and creativity, and destroys the very performance that is key to today's success. High control requires high management overhead costs. Eliminating fear and unnecessary control increases commitment, creativity and other discretionary effort.

Managers create commitment by sharing vision and values, involving employees in decision making, facilitating knowledge of customers and performance, and helping to improve the process.

2. Task Focus to Process and Customer Focus

In the past, managers were responsible for defining employee responsibility in terms of specific tasks. Industrial engineers measured each movement and the manager's job was to cause employees to adhere to the task definition. In today's work environment, the "right" task definition changes too frequently as methods and machinery are continuously improved. Highly specific definitions quickly become rigid and an obstacle to improvement.

To optimize quality, employees at all levels must understand who their customers are, their requirements, and they must be involved in efforts to improve their process to meet customer needs. A quality organization is a customer-focused organization. A customer-focused organization defines work in terms of responsibility for complete processes that serve customer needs.

Managers must know who their customers are. Even the president of the company has customers. Among those customers are the employees, stockholders, end-use customers, internal customers, and the community. The manager's job is conditioned by his understanding of the needs of his customers.

3. Command to Consensus Decision Making

Command decision making has been the dominant, male, decision-making model for most of mankind's existence. In Henry Ford's factory, the workers were mostly uneducated and a had little knowledge of the work process beyond their immediate station on the assembly line. Command decisions produced the conformity and uniformity that lead to success in the highly repetitious work.

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Things have changed. Rather than centralized command decision making, we need commitment, involvement and ownership which leads to creativity and acceptance of responsibility. Even the President of the United States must consult with other leaders. The Soviet Union is moving towards consensus decision making. Corporate CEO's must consult with stockholders, analysts and interest groups. The degree of system integration or interdependence between organizations and people, dictates a consultative or consensus decision process.

Most managers are now struggling to find the boundaries that define the appropriate style of decision making. It is very difficult to switch styles. We develop habits of decision making which are hard to change. It is normal to be somewhat confused and to have difficulty making this transition. If you are experiencing this difficulty, you may take some comfort in knowing that you have lots of company.

4. Individual Work to Team Work

In the past, managers assigned tasks to individuals and then rewarded or punished. This worked well as long as the tasks were simple and independent.Today, tasks are increasingly complex and interdependent requiring greater teamwork. Teamwork requires decision making by the employee and among employees. Today, in many team-based organizations, employees are making their own decisions about which tasks will be completed by whom. They may take turns rotating tasks, or they may choose to specialize in tasks.

Now the manager helps the team make these decisions well and assures that the process is functioning well.

12 Paradigm Shifts to World-Class Quality

1. **Control Management ⇨ Commitment Leadership**
2. **Command Decisions ⇨ Consensus Decisions**
3. **Individual Work ⇨ Team Work**
4. **Task Focused ⇨ Process & Customer Focus**
5. **Experts & Labor ⇨ Experts All**
6. **Control Through Threats & Fear ⇨ Control Through Positive Reinforcement**
7. **One Right Way ⇨ Continuous Improvement**
8. **Record Keeping ⇨ Score Keeping**
9. **Tall & Rigid Structure ⇨ Flat & Flexible Structure**
10. **Unstated Values & Vision ⇨ Shared Values & Vision**
11. **Tough On People ⇨ Tough On Competition**
12. **Wealth Exploiting ⇨ Wealth Creating**

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5. Experts & Labor to Experts All!

Even in our laws, we have enshrined the class distinction of labor and management, salaried and hourly, thinkers and doers. Perhaps this class distinction made sense on the farm or in the primitive factory. It does not make sense today!

Today, "workers" may operate multi-million dollar pieces of complex, computer-controlled production machinery which in itself represents a whole production process. Most employees today are "knowledge" workers, regardless of the color of their collar, whether they push paper or steel. Accepting and promoting all employees as experts in their process is critical to the thinking of a quality organization.

Managers may still be expert in a particular technical area. Increasingly, the role of managers will be to advise and educate the team on technical matters and assist in the improvement of equipment and technical processes. However, the team is also an expert team. They are expert on their process and it is the manager's role to assure their competence, to provide the training, coaching and feedback that will allow them to succeed.

6. Punishment to Positive Reinforcement

On the sailing ships of the British navy, Lord Nelson and the other captains ruled by leadership and punishment. Specifications detailed the punishments for any offense, from flogging to the yard arm. The men expected and the captain relied upon strong punishment. The men were conscripts with few options and largely ignorant. The nature of the work and the workers was consistent with the use of punishment.

In the modern organization, everything is changed. Little punishment is allowed and everyone seeks and expects recognition and reward. Behavior is a function of its consequences. You get that which is rewarded. Performance must be made to matter with positive reinforcement.

Many managers have a great deal of difficulty providing positive recognition. Praising others is uncomfortable. For years they have seen their role as enforcing proper discipline, assuring that people are doing their assigned tasks, doing what they are "supposed" to do. If they are "supposed" to do it, they should not have to be praised for it! Right? Wrong!

Today, it is the manager's responsibility to provide an environment in which employees are encouraged to make suggestions, think creatively and become enthusiastic about their team's performance. This can only be accomplished if managers recognize good performance, are outspoken in their praise, and demonstrate that they truly value the initiative of their associates.

7. One Right Way to Continuous Improvement

Products and services, requirements, and work processes changed slowly in the past. These change overnight today. By the time the "right way" is discovered, a new way is required. We must adopt the "racing spirit." Like continuous improvement of race cars on the track, we must constantly be looking for a better way.

In the past, the manager was the authority on the right way to do things. If he did not know how it was supposed to be done, he was seen as weak. Therefore, he often acted like he knew the right answer, even when he did not. Now the manager is liberated from this dehumanizing assumption.

Now it assumed that the "right way" is constantly moving forward. The new, "best way" may come from the lowest-level employee who has their hands on the product. Now the manager is not judged by knowing the right way, but by helping to facilitate continuous improvement. Continuous improvement is only possible if

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everyone at every level and in every function, is involved and accepts responsibility for improving performance to customers, not just the manager.

8. Record Keeping to Scorekeeping

In the past, managers kept the numbers to keep track of others. Managers kept track of employees. Customers kept track of their suppliers. Accounting kept track of everybody. The assumption was that people, fundamentally, could not be trusted.

The manager in the team-based organization assumes that people can be trusted, given the correct system. A part of that system is numbers that allow people to keep their own score, set their own objectives, and experience the game of business. The manager today helps to provide the numbers to the team. The manager helps to provide numbers to suppliers so they can improve their work.

The manager in a team-based organization is a coach. What do coaches do? They provide feedback to their team members. The best kind of feedback is facts, numbers, and scores on the performance of the team. The coach helps to interpret those numbers based on his own experience. The coach helps the team members by suggesting things they can do to improve the numbers. However, when possible the coach allows the team members to decide on their own actions.

9. Tall and Rigid Structure to Flat and Flexible Structure

As civilizations and companies rise, the buildings grow in height and have increasingly specialized rooms, complex patterns and decorations. The organization chart and the patterns in our minds follow suit.

Bureaucracies have many layers and become rigid. Bureaucracies create fiefdoms within and internal warfare among competing departments. The walls grow, isolating people and slowing the work process. Improvement becomes increasingly difficult.

The team-based organization is in motion, with experts working across functions or disciplines taking responsibility for the entire process that serves customers. Because people are trusted and work in self-managing teams, rigid structure and layers of management are not necessary.

This has tremendous implications for the manager. In the past, managers measured their success by their rank, by the number of rungs on the ladder they had climbed. In the future, there will be fewer layers of rank. If managers continue to measure their success based on rank, they will find themselves disappointed.

In the future, managers will measure their success based on genuine accomplishment; new products developed, new levels of performance achieved, new methods developed and new customers served. These are the genuine accomplishments of business, not levels or ranks. Now, managers must be recognized and appreciated for these contributions. New systems of compensation and recognition must be developed to encourage managers to spend their time and energies on activities that add value to their true customers.

10. Unstated Values to Stated and Shared Values

In the past, the leaders were not accountable to those below and did not need to reveal their principles. They only answered to someone above. The United States Constitution established the pattern of an agreed upon set of principles to which the governors and those governed would mutually adhere.

Likewise, quality organizations have clearly stated values that define desired behavior, ethics and goals. When values are clearly stated and

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shared, they serve as a unifying force directing energy toward productive effort.

Stated and shared values create a problem for managers. They are expected not only to conform to these principles, but to be an example. If the organization values teamwork, managers are expected to model teamwork. If the organization values customer focus, managers are expected to model customer focus. If the organization values continued learning, managers are expected to model continued learning. This is a heavy burden for managers to bear.

11. Tough on People to Tough on Competition

One of the greatest misconceptions about leadership during the recent past is that leaders are tough on their own people. The world's greatest military leaders (Alexander the Great, Lord Nelson, Napoleon, etc.) all demonstrated great affection and affiliation, even tenderness, toward their own people. They were hard on their competition. Many of our so-called "tough" bosses, such as Frank Lorenzo at Eastern Airlines, are tough on their own people and easy on their competition. Delta has thrived while Lorenzo has been "tough."

12. Wealth Consuming to Wealth Creating

The quality organization fulfills the fundamental role of a business organization in a free society by creating new products and services. This creates new jobs and adds to the collective wealth of the society.

Those of us in business organizations can feel good about our contribution to society. We fulfill a worthwhile and noble purpose. It is the business organization that creates jobs, goods and services, and determines the wealth of the society. In poor countries, it is likely that the business institution is not fulfilling its purpose.

Within our organizations, we have a responsibility to ensure that we spend our resources in a way that adds value and creates wealth. This can only be accomplished if managers see themselves as responsible for creating new products and services, improving products and services, making better use of all resources, and thereby creating new jobs. This is the wealth-creation process.

A Note On How To Read Cases

There is no one "right way" to implement the principles and practice of quality management and teams. The reason to study cases is not to find a cookie cutter approach that you can apply to your organization. Rather, the reason to study cases is to see how others have innovated, found methods that worked for them in their situation and, to expand your own experience.

Look for principles, not prototypes to imitate. One company may have had their meetings every day and found this successful. Another may have formed cross-functional teams. Another may have started with management teams. However, their situations are not identical to your own. What made it work for them? How are you similar and how are you different? What would happen if you did it that way? Is there a better way? What was the principle they were applying and how can you apply that same principle?

The purpose of cases is to help you think creatively.

Some use them to avoid thinking. The real meaning of team management is that you, with your team, are capable of becoming your own *"world's greatest experts."*

The Honda Way A Visit To Marysville

by Lawrence M. Miller

It became a practice at Honda America Manufacturing in Marysville, Ohio to use my book American Spirit as a management development text. This resulted in an invitation to visit and present to the Honda management group. I spent two days touring the plant, speaking with managers and production associates, sitting in on meetings and asking lots of questions. Why is Honda so good? The answer is both simple and complex. There is little that Honda does that is completely unique. There is nothing that stands out as their secret to quality. The secret is - they do everything - and they do it as a team!

I find that in every healthy corporate culture there is a common understanding of philosophy, the values and visions upon which decisions and practices are based. The management practices, the structure, systems, skills, style and symbols, are consistent with the philosophy. At Honda there is clearly a "Team" culture.

Even before entering the building, the philosophy became evident. As we drove toward the plant I noticed lines of newly planted trees. I was told that they were planted by newly hired associates. Each new associate plants a tree "so they can grow with the company." All associates (the term used for all employees) know the company philosophy. They see it every day in one hundred ways. They hear it consistently from their leaders. There are no contradictions.

The President of Honda of America is Shoichiro Irimajiri, known as Mr. Iri by the associates. Earlier in his career, Mr. Iri was responsible for managing Honda's successful racing efforts, designing engines and managing production facilities in Japan. He frequently speaks of the "Racing Spirit." The Racing Spirit includes five principles: 1. Seek the challenge; 2.

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Be ready on time; 3. Teamwork; 4. Quick Response; 5. Winner Takes All! Perhaps more instructive of the Honda philosophy, is his story of one of his early racing efforts.

It was in 1965 when Mr. Iri was working on the Formula 1 racing engines. In the British Grand Prix of that year, the engine failed and it was torn down and examined by Mr. Honda himself.

Examining the failed piston he turned to Shoichiro Irimajiri and demanded, "Who designed this piston?" "I did," he acknowledged. After examining the engineering drawing Mr. Honda roared out, "You! Stupid! No wonder the piston gets burned. You have changed the thickness here." After the young Irimajiri attempted to defend his design change with some data from previous engines, Mr. Honda roared again. "I hate college graduates! They use only their heads. Do you really think you can use such obsolete data obtained from old, low performance engines? I have been making and designing pistons for several years. I am fully aware how critical half a millimeter is here. A company does not need people like you who use only their heads. Before you laid out this design, why didn't you listen to opinions of those experienced people in the shop? If you think academic study in college is everything, you are totally wrong. You will be useless in Honda unless you spend more time on the spot for many years to come."

"You will go to the machining shop," Mr. Honda ordered the young engineer, "and you will apologize to every person there, for you have wasted their efforts." Mr. Honda followed him down the hall to make sure he did as directed. Mr. Iri recalls that he was only glad that he had no ambition of becoming president of the company. He was not even sure he would succeed as an engineer. He learned his lesson. He not only succeeded as an engineer, designing several successful racing engines, but he became the president of Honda of America, the first Japanese company to export cars back to Japan. Shoichiro Irimajiri is still listening to those experienced people in the shop and he is not wasting their time.

The Honda philosophy stresses that you must be on the spot in the plant and see the problem, touch the part and gain experience in the actual job, in order to effectively solve a problem. Engineers and management spend most of their time in the factory, in touch with their associates, the product and process.

The Honda philosophy is manifested in all of the management practices. In the ***symbols, structure, systems, skills and style*** the philosophy can be seen and experienced every day, by every employee, every hour.

Symbols: When I arrived I was given a uniform to wear in the plant. I was told that this wasn't given to all guests, only "honored guests." To cover my tie with the white smock with the Honda name, to look the same as every other associate, was an honor. I can assure you that by the time my visit was finished it felt like an honor. To be part of a proud group of people, to share their symbol of equality caused me to feel a part, invested, in their shared goals.

All associates, from the president to the newest hired associate, eat in the same cafeteria, park in the same undesignated parking spaces, and managers sit at the same metal desks in open office areas. Most of the desks are arranged in blocks of six, often with paired Japanese and American managers sitting across from one another. All of the managers of the motorcycle plant sit at one block of six identical desks, the Japanese vice president and the American plant manager sitting across from each other.

As I walked through the plant, the cleanest non-food manufacturing plant out of several hundred I have been in, I observed a vice president stop and pick up a misplaced object on the floor. There is nothing on the floor. There are also NO maintenance people to clean up! Everyone, every associate and manager, cleans his own area.

To many, these symbols will seem trivial.

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They would be if they stood alone, at odds with the behavior and attitudes of the people, or if the structure and systems stood in contradiction. However, they are one part of a total system, like a well-engineered engine with all components balanced and moving in unison.

Structure: Everyone is a member of a team. The team is the first level of organization. At 6:30 a.m. each morning, every associate meets with his team and team leader. The day's work is discussed and feedback on the previous day's quality is given. Any problems, changes or concerns are shared during this meeting.

A team is comprised of 15 to 20 associates who work in a common area. As I toured both the auto and motorcycle plant, I stood and watched the assembly line in operation. I asked which person was the team leader and which was the production coordinator, the second-level manager. It was very hard to find them or distinguish them. I watched as there was an apparent problem on the motorcycle line. One employee was having difficulty getting a frame over an engine assembly. He had stopped the line. He and another associate worked frantically to get the frame in place. It took about twenty seconds and the line was moving again. I asked where the team leader was. The other associate, helping to free the frame, was the team leader. The production coordinator was at the next station on the assembly line helping another associate catch up on the placement of electrical wire assemblies. I watched for about fifteen minutes as the team leader and production coordinator (equivalent of first-line supervisor and department manager) worked on the line, smiling, joking and working hard and fast with their associates.

Nowhere is there a private office for team leaders or production coordinators. They do not remove themselves from the work. They are on the spot, seeing and touching the product, gaining experience and solving problems. They are part of the working team.

All managers are organized into teams and solve problems together. The structure of the organization, as well as the physical arrangement of desks and offices, makes group problem solving a natural and constant occurrence.

Participation in the constant improvement process is also structured through Quality Circles. NH Circles (NH stands for "now Honda, new Honda, next Honda") are similar to circles in many other companies. However, at Honda they are one component of a total involvement process which they call VIP (Voluntary Involvement Program).

VIP includes a suggestion system, quality awards and safety awards. Twenty percent of all associates participate in circles. The rate of suggestions adoption is 59.4%, and 60% participate in some component of the VIP process. In speaking with several NH Circle members, I was impressed that they felt the responsibility to see that accepted recommendations for improvement were implemented. They also felt that their circles were different from those in other companies in that they are constantly looking for any improvement in the production process, large or small, and even small improvements are highly valued. They said that the success of Honda was the result of constantly finding small improvements, not just looking for major ones.

Systems: I expected to find systems of employee involvement at Marysville. However, I was somewhat surprised to see the amount of thought that has been put into the positive reinforcement systems. Honda of America practices performance management. They have found ways to provide constant feedback, recognition and tangible positive reinforcement for almost every form of desirable performance.

The NH Circle program, suggestion system, quality awards and safety awards are all tied together with a point system. Every associate can earn points by participating in any of these improvement processes. Awards include award certificates, gift certificates, Department Manager's Award, Plant Manager's Award, and President's Award. These also result in points accumulating over your career and these points can earn a

Honda Civic (that's for 2500 points), and an Accord (5000 points) plus two weeks off with pay and airplane tickets to anywhere in the world with spending money.

In addition to hourly or salaried compensation, all associates participate in profit sharing. This profit sharing is an innovation of Honda of America and is not part of the system in Japan. Ten percent of the gross profit generated by Honda Motor Company is shared with associates based on their relative compensation. Good attendance results in another bonus. The average bonus check for attendance in 1986 was $832. The average profit sharing check was $2,688.

Performance analysis and feedback is an important part of any total performance management system. In each of the open office areas and in each of the many conference rooms, all of the walls are literally covered with charts and graphs representing different quality and productivity performance variables. The graphs are of every possible variety, some employing Statistical Process Control methods and some simply reflecting historical data with means, trends and goal lines. Frequently, along with the charts on the wall are lists of causes or solutions to problems. Diagrams of auto parts or production machinery with arrows pointing to sources of problems are also frequent. It is obvious that all of the managers at Honda are in touch with plant performance data.

Another system worthy of mention is the discipline system. There are some fairly traditional and sound procedures for gradual counseling and discipline. However, the unique part of the discipline process is the peer review provided for associates who are dismissed for poor conduct. If an associate wishes to appeal a termination, a peer review panel is formed by randomly selecting six or eight production associates. One senior manager also serves on the panel with equal vote. The panel hears both sides of the case and then decides to overturn or accept the management decision. Nine out of ten times the decisions are upheld by the associates.

Skills: The measure of skills is found in the product of work. There can be no question that Honda has highly skilled engineering and quality personnel. The majority of the engineers are Japanese. Hiring and training more Americans is a goal for the coming years. Honda is an engineering company. Most of the Japanese senior managers have served as design engineers for engines, including racing engines, or other components.

Having worked at other auto companies, it soon became obvious to me that at Honda the most valued personnel are those with engineering and technical competence. At many other companies, it is the financial managers and management professionals who are most valued. Honda is in the business of making excellent cars. Many other companies are in the business of making money, and only secondarily, making cars. Honda makes money and does not need layers of bureaucratic managers because they are passionately dedicated to their technology and products.

On the assembly line, there is a process of continual skill development. Associates are rotated from one position to another to broaden their skills and increase their flexibility. Even when applicants are interviewed for employment at Honda, they are asked questions to determine their flexibility. Flexibility and the development of broad-based skills is a central principle.

At Honda, it is assumed that the production associates are intelligent, skilled and dedicated. They can, therefore, be trusted to manage the quality process. Every associate is a quality control inspector. The assembly process at Honda is based on just-in-time (JIT) inventory and the assumption of 100% quality parts. Each associate understands that it is his or her job to inspect each part to assure conformance to requirements. Any associate can reject a part. If a manager wants the part used after the associate has rejected it, the burden is on the manager to explain to the associate why it should be used. There is a quality assurance department with a team of

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associates who will call the supplier regarding any and every bad part. Every vendor is assigned to one associate and that associate knows exactly who to call, including home telephones, to provide immediate feedback on any deviation from quality requirements.

Style: All of the methods described above are held together by people with a sense of humor and a high level of people-to-people skills.

As I interviewed managers, I repeatedly asked them how they felt working for, or with, Japanese managers. I wanted to know if there was any resentment toward the Japanese. I could find absolutely none. I could only find the most sincere respect and friendship. There was no feeling of "us Americans" working for "them." The reason for this mutual respect became more clear the next morning.

Every morning the 10 or 12 managers of the motorcycle plant meet to review performance, solve problems, and make plans for the day. The Japanese vice president responsible for the motorcycle operations sat at the end of the table. The meeting was led by a manager who was two levels down. There was a lively discussion about the handling of an "almost-in-time" inventory situation that had almost halted production the previous day. There were three or four Japanese managers and about eight Americans in the meeting. One of the Japanese managers was very vocal about how confusing the situation was and how it should have been handled better. Several others discussed what happened and how it was being resolved today. The vice president sat quietly through a half hour of discussion, never saying anything until the meeting was coming to a conclusion. Only then did he speak out. He had two points. First, he wanted to thank everyone for their efforts yesterday, rising to meet the challenge presented by their problem. Second, he wanted to stress how important it was to meet another challenge that was coming up within the next week. His tone was calm and reassuring.

These incidents, and dozens of others like them, proved to me that the integration of cultures is working in Marysville. The Americans have adopted the Japanese patience and view things from a long-term perspective. The Japanese have adopted, or at least accepted, the American fun loving familiarity and creativity.

The style at Honda is different than other Japanese companies and this may be central to their success and initiative in manufacturing in the United States. The traditional Japanese company places a high value on age and seniority. Honda does not. Mr. Irimajiri is a young man excited by winning races and building racing engines. Mr. Honda has retired because he believes the company should be run by young men. The first principle of the Honda management policy is, "Proceed always with ambition and youthfulness." The second is, "Respect sound theory, develop fresh ideas and make the most effective use of time." The third is, "Enjoy your work, and always brighten your working atmosphere."

Honda now employs nearly 6,000 youthful-minded and creative Buckeye associates in Marysville. That number will be raised to over 8,000 as they build their second auto assembly plant nearby. The U.S.-manufactured content of the Honda Accord is now about 60% and will be increased to 75%. The Accord is more American than some GM, Ford or Chrysler nameplates with higher imported content.

As I left Marysville, I didn't leave with the feeling that I had visited a "foreign" manufacturer. Rather, I had the feeling that I had visited something new. I had visited a world-embracing company, with a world-embracing philosophy, as much American as Japanese, perhaps the best of both worlds. I could also think of nothing that Honda was doing, no secret in either principle or practice, that could not be adopted by any company - if its senior managers were knowledgeable, committed, and would "proceed always with youthfulness."

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Skippy Peanut Butter

In Little Rock, Arkansas, Skippy Peanut Butter, a division of Best Foods, Inc., has created a totally team-based culture and experienced dramatic results from their efforts. It is a radical team approach, and it works!

Skippy has 100 employees. Their management structure is impressive. One general manager, one human resource manager and one quality assurance manager. That's it! No supervisors, only teams, managing themselves to the highest quality standards. In addition, they report that no one has a fixed job or job description.

The 100 employees are all organized into teams. They are thoroughly briefed on every aspect of the organization's operations including costs, sales, distribution and planning. They are all trained to do all of the plant's normal jobs as well as all of the traditional supervisory and management jobs.

All are paid salaries based on their individual skills and knowledge which are tested. Testing is monthly, rigorous and objective. The more they know the more they earn. When an employee is hired, they are presented with the challenge of a ten year, step-by-step career path which will keep them constantly growing.

It took Best Foods many years to develop the system at Little Rock. It was not an overnight thought, a passing fad, or minor commitment. It required commitment at the highest level. Many did not believe it was possible to manage a plant without job descriptions or control.

Skippy went about it in a unique way, a way that will not be possible for most organizations. Before the plant was opened, the new system was designed and employees were hired specifically to work in this system. They were carefully selected and trained.

Teaching employees self-management skills was a key to their success. Each employee received about 40 hours of "social training", skills in team problem solving, team dynamics and accepting responsibility for products and customers. The three most popular and most practical parts of the curriculum were the classes in "work-flow planning," "conflict resolution," and "self-managing skills."

Employee teams of five to ten met to assign work democratically, by vote. After a while individuals would volunteer for specific tasks, reducing the need to vote. Often, unpleasant and dirty work was volunteered for and an informal rotation developed. They learned to genuinely work as teams. This was the single most critical element of their success.

Supervisory tasks were assigned to teams. Within each team, all of the normal supervisory responsibilities rested, not with individuals, but with the team as a group. "You've heard of self-cleaning ovens," proclaimed one woman on the assembly line, "well this here is a self-managing plant!"

Each team has from five to ten members, their own office and their own space, with their reports, flow charts and graphs depicting schedules, quality goals, and achievements covering the walls. Each team elects its own secretary to keep track of its postings of commitments and achievements and to keep track of past decisions. Teams appoint coordinators to interface with the general manager, human resource manager and product assurance manager. The quality assurance manager trains every team in quality management skills and gives them feedback on their progress.

One of the tasks the team members particularly enjoy is interviewing and passing judgment on new job applicants. They are tougher than any personnel department. They question applicants in-depth. They are particularly deliberate in determining whether an applicant will fit in with their team and work with them to help them achieve their goals.

Within 24 months, the Skippy Little Rock plant was setting both production and quality records. They have maintained their team system through several new plant managers (each of which had to be educated by the employees).

Skippy is an example of a plant designed around socio-technical system principles. Both the technical flow of the work, and the social environment, are designed together, all on team principles. Skippy, and other plants like it, prove that the human satisfaction of employees and the production and quality goals can be satisfied *TOGETHER IN TEAMS*.

(This article is from Productivity, Inc., Newsletter, Vol.3,No.11. Productivity is a source of many fine case studies of quality practices.)

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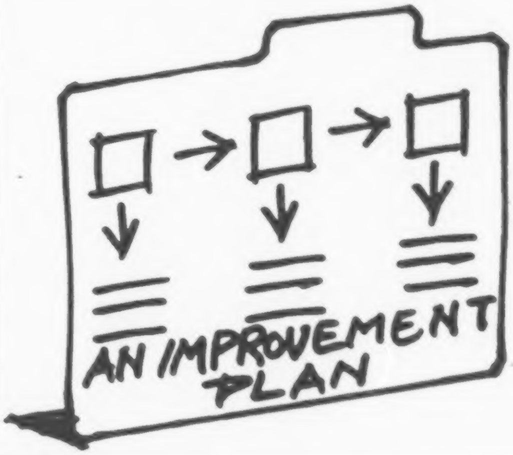
Ten Ingredients For a Successful Team

1. Clarity in Team Goals
2. An Improvement Plan
3. Clearly Defined Roles
4. Clear Communication
5. Beneficial Team Behaviors
6. Well-defined Decision Procedures
7. Balanced Participation
8. Established Ground Rules
9. Awareness of the Group Process
10. Use of the Scientific Approach



Guidelines For Reacting to Group Problems

- Anticipate and prevent group problems whenever possible.
- Think of each problem as a group problem.
- Neither over-react nor under-react. A leader's range of responses typically includes:
  - § Do nothing (non-intervention)
  - § Off-line conversation (minimal intervention)
  - § Impersonal group time (low intervention)
  - § Off-line confrontation (medium intervention)
  - § In-group confrontation (high intervention)
  - § Expulsion from the group (Do Not Use This Option)

Guidelines for Constructive Feedback

- Acknowledge the need for feedback
- Give both positive and negative feedback
- Understand the context
- Know when to give feedback
- Know how to give feedback
  - § Be descriptive.
  - § Don't use labels.
  - § Don't exaggerate.
  - § Don't be judgmental.
  - § Speak for yourself.
  - § Talk first about yourself, not about the other person.
  - § Phrase the issue as a statement, not a question.
  - § Restrict your feedback to things you know for certain.
  - § Help people hear and accept your compliments when giving positive feedback.
- Know how to receive feedback
  - § Breathe.
  - § Listen carefully.
  - § Ask questions for clarity.
  - § Acknowledge the feedback.
  - § Acknowledge valid points.
  - § Take time to sort out what you heard.

n Easy-to-Remember Guide for onstructive Feedback

Sequence	Explanation
1. "When you..."	Start with a "When you..." statement that describes the behavior without judgment, exaggeration, labeling, attribution, or motives. Just state the facts as specifically as possible.
2. "I feel..."	Tell how their behavior affects you. If you need more than a word or two to describe the feeling, it's probably just some variation of joy, sorrow, anger, or fear.
3. "Because I..."	Now say why you are affected that way. Describe the connection between the facts you observed and the feelings they provoke in you.
(4. Pause for discussion)	Let the other person respond.
5. "I would like..."	Describe the change you want the other person to consider...
6. "Because..."	...and why you think the change will alleviate the problem.
7. "What do you think?"	Listen to the other person's response. Be prepared to discuss options and compromise on a solution.

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CONTINUING EDUCATION

PROGRAM EVALUATION

Please help us in maintaining and improving OSU/ATI's Continuing Education Programs by completing this form.

Course Title______________________________ **Date**___________________

Instructor_________________________________

Please check the proper column:

	Excellent	Good	Fair	Poor
1. Overall Program rating	____	____	____	____
2. Course content				
a. The course expanded my knowledge of the subject	____	____	____	____
b. The course was interesting and informative	____	____	____	____
c. The course met my expectations	____	____	____	____
d. The program was valuable for my needs	____	____	____	____
e. Handouts were effective	____	____	____	____
f. The material presented was practical and useful for application	____	____	____	____
3. Format and Facility				
a. Adequate time was allotted to cover subject	____	____	____	____
b. Adequate time was allotted for questions and answers	____	____	____	____
c. Rate the adequacy of the facility and room(s) (comfort, ventilation, acoustics, temperature)	____	____	____	____
4. Instructor's performance				
a. Ability to present material clearly	____	____	____	____
b. Presentation style	____	____	____	____
c. Knowledge of subject	____	____	____	____
d. Flexibility in adjusting course to student needs	____	____	____	____
e. Effectiveness of visual aids (flip charts, films, etc.)	____	____	____	____

OVER

5. Would you recommend this course to others?

1. Yes ____

2. No ____ (If not, please explain your reasons in Number 6.)

6. Please indicate additional comments. We are particularly interested in how the course and instructor did or did not meet your expectations. What recommendations would you make if the course were to be given again?

7. What additional knowledge/skills are you interested in acquiring in the next continuing education program you attend? In what other areas can we provide similar programs?

8. May we use your comments in our promotional material?

____ Yes ____ No Signature (optional)________________________________

A Lesson From The Geese

When a goose gets sick or wounded or shot down, two geese drop out of formation and follow their fellow member down to help and provide protection. They stay with this member of the flock until he or she is either able to fly again or dies. Then they launch out on their own, with another formation or to catch up with their own flock.

***LESSON:** If we have as much sense as the geese, we'll stand by each other like that.*

A Lesson From The Geese

The geese in formation, honk from behind to encourage those up front to keep up their speed.

LESSON: We need to make sure our honking from behind is encouraging - not something less helpful.

A Lesson From The Geese

Whenever a goose falls out of formation, it suddenly feels the drag and resistance of trying to fly alone, and quickly gets back into formation to take advantage of the "lifting power" of the birds immediately in front.

***LESSON:** If we have as much sense as a goose, we will go in formations with those who are headed where we want to go.*

A Lesson From The Geese

When the lead goose gets tired, it rotates back into the formation and another goose flies at the point position.

LESSON: It pays to take turns doing the hard tasks, and sharing leadership - with people, as with geese, interdependent with each other.

A Lesson From The Geese

As each bird flaps its wing, it creates an "uplift" for the bird following. By flying in a "V" formation, the whole flock adds 71% more flying range than if each bird flew alone.

***LESSON:** People who share a common direction and sense of community can get where they are going quicker and easier because they are traveling on the thrust of one another.*

THE OHIO STATE UNIVERSITY
Agricultural Technical Institute

CONTINUING EDUCATION

PROGRAM EVALUATION

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c. The course met my expectations	____	____	____	____
d. The program was valuable for my needs	____	____	____	____
e. Handouts were effective	____	____	____	____
f. The material presented was practical and useful for application	____	____	____	____
3. Format and Facility				
a. Adequate time was allotted to cover subject	____	____	____	____
b. Adequate time was allotted for questions and answers	____	____	____	____
c. Rate the adequacy of the facility and room(s) (comfort, ventilation, acoustics, temperature)	____	____	____	____
4. Instructor's performance				
a. Ability to present material clearly	____	____	____	____
b. Presentation style	____	____	____	____
c. Knowledge of subject	____	____	____	____
d. Flexibility in adjusting course to student needs	____	____	____	____
e. Effectiveness of visual aids (flip charts, films, etc.)	____	____	____	____

OVER

5. Would you recommend this course to others?

   1. Yes ____

   2. No ____ (If not, please explain your reasons in Number 6.)

6. Please indicate additional comments. We are particularly interested in how the course and instructor did or did not meet your expectations. What recommendations would you make if the course were to be given again?

____

____

____

7. What additional knowledge/skills are you interested in acquiring in the next continuing education program you attend? In what other areas can we provide similar programs?

____

____

____

8. May we use your comments in our promotional material?

   ____ Yes ____ No Signature (optional)________________________________

APPENDIX

SUPPLEMENTAL TEXTS:

Robert R. Bell and John M. Burnham, Managing Productivity and Change, South-Western Publishing Co., Cincinnati, OH, 1991.

Dave Francis and Don Young, Improving Work Groups, A Practical Manual for Team Building, University Associates, LaJolla, CA, 1979.

Thomas Gordon, Leader Effectiveness Training, Bantam Books, NY, 1977.

Robert B. Maddox, Team Building, an Exercise in Leadership, Crisp Publications, Los Altos, CA, 1988.

George Manning and Kent Curtis, Group Strength-Quality Circles at Work, South-Western Publishing Co., Cincinnati, OH, 1988.

George Manning and Kent Curtis, Performance: Managing for Excellence, South-Western Publishing Co., Cincinnati, OH, 1988.

Tom Peters, Thriving on Chaos. Handbook for a Management Revolution, Knopf, San Francisco, 1987.

Barbara Sher and Annie Gottlieb, Teamworks, Warner Books, NY, 1989.

Glenn H. Varney, Building Productive Teams, Jossey-Bass, San Francisco, 1989.

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Robert R. Blake, Jane S. Mounton, Robert L. Allen, Spectacular Teamwork-How to Develop the Leadership Skills for Team Success, John Wiley and Sons, NY, 1987.

Frank M. Gryna Jr., Quality Circles-A Team Approach to Problem Solving, Amacom, 1979.

Robert W. Keidel, Game Plans, Sports Strategies for Business, E. P. Dutton, NY, 1985.

Tom Peters, A Passion for Excellence, Random House, NY, 1985.

J. William Pfeifer and John E. Jones, The 1974 Annual Handbook for Group Facilitators, University Associates, Inc., San Diego, 1974.

Ernest Stech and Sharon A. Ratliffe, Working in Groups, A Communication Manual for Leaders and Participants in Task-Oriented Groups, National Textbook Co., Skokie, IL, 1979

Dean Tjosvold, Working Together to Get Things Done-Managing for Organizational Productivity, D. C. Heath, Lexington, MA, 1986.

Mike Woodcock, Team Development Manual, Gower Press, Hants, England, 1979.

PERIODICALS:

Ellen J. Belzer, "12 Ways to Better Team Building," Working Woman, August 1989, pp 12-14.

Peter Block, "How to be the Now Kind of Manager," Working Woman, July 1990, pp 51-54.

Brian Dumaine, "Who Needs A Boss?," Fortune, May 7, 1990, pp 52-60.

John Ellis, "Monsanto is Teaching Old Workers New Tricks," Business Week, August 21, 1989, p 47.

Mark Ivey and Geoff Lewis, "How Compaq Gets There Firstest With the Mostest," Business Week, June 26, 1989, pp 146-150.

John Hoerr, "The Cultural Revolution at O. Smith," Business Week, May 29, 1989, pp 66-68.

John Hoerr, "The Payoff From Teamwork," Business Week, July 10, 1989, pp 56-62.

Pamela King, "What Makes Teamwork Work?," Psychology Today, December 1989, pp 16-17.

Kenneth Labiah, "Hot Company, Warm Culture," Fortune, February 27, 1989, pp 74-78.

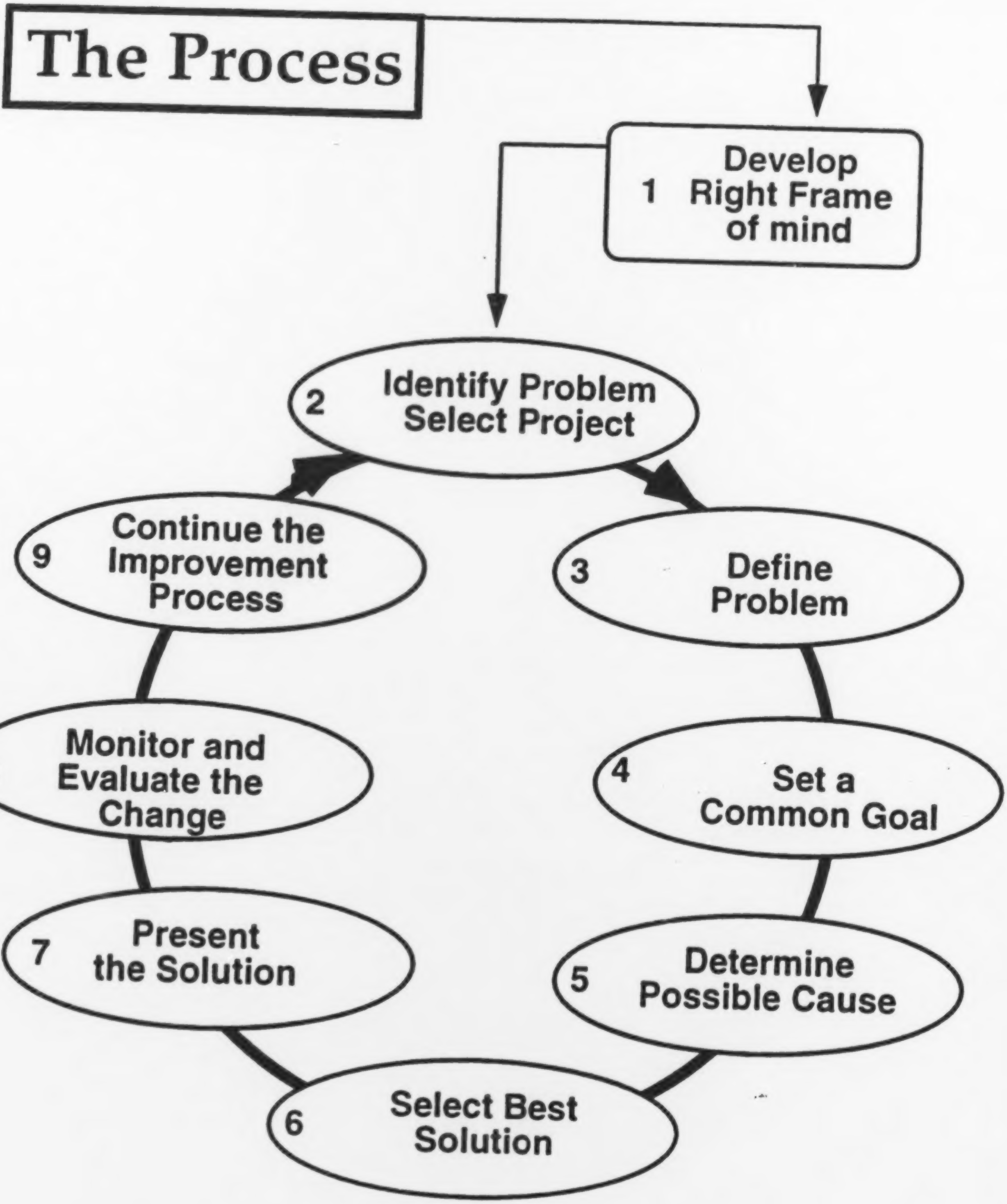
Alan H. McGazine, "Competing by Cooperating," Vital Speeches of the Day, May, 1989, pp 604-608.

Jerome M. Rosow, "New Roles for Managers," Vital Speeches of the Day, March 1, 1990, pp 300-303.

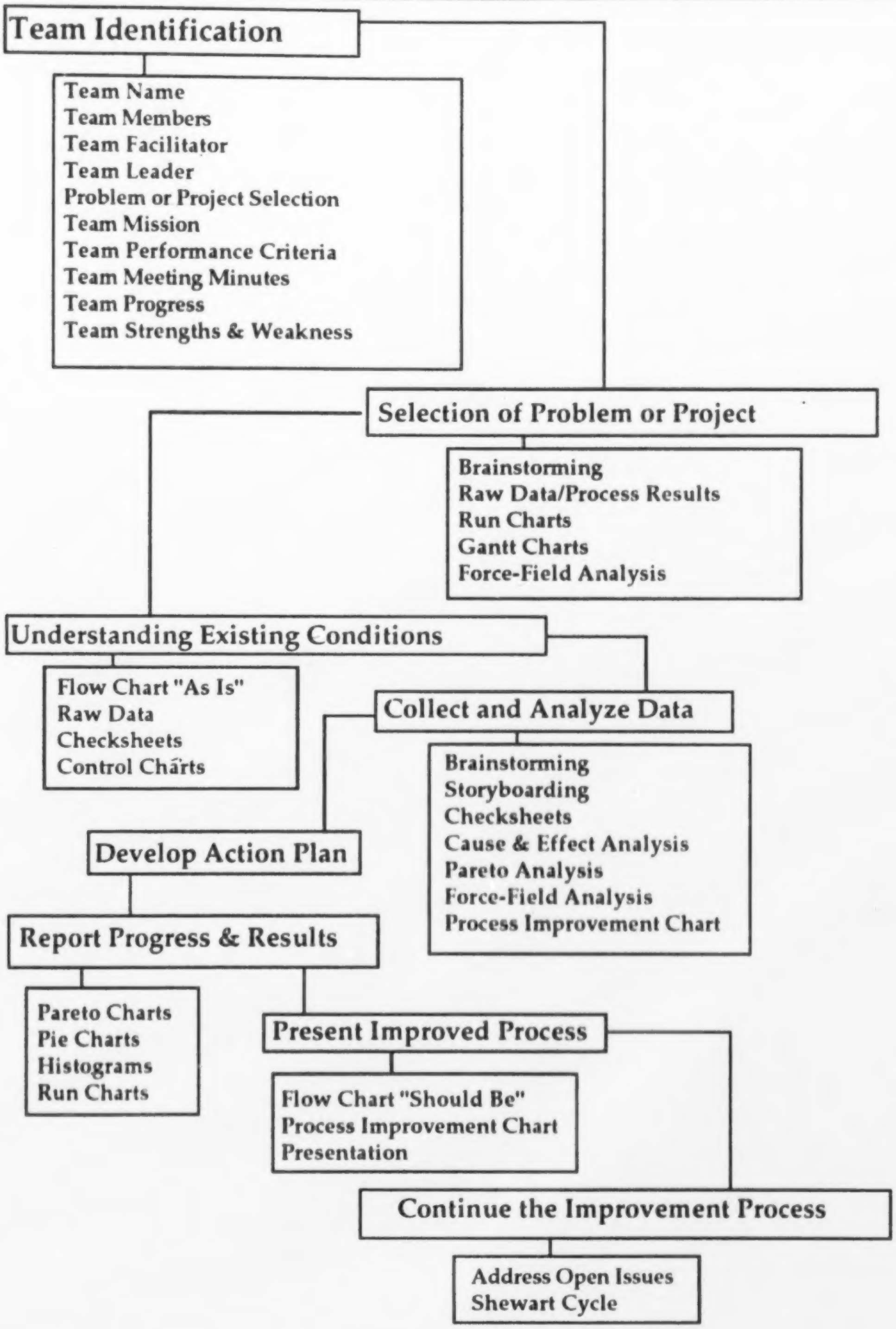
Bill Saporito, "The Revolt Against Working Smarter," Fortune, July 21, 1986, pp 58-65.

Alex Taylor III, "Back to the Future at Saturn," Fortune, August 1, 1988, pp 63-72.

The Process


1 Develop Right Frame of mind
2 Identify Problem Select Project
3 Define Problem
4 Set a Common Goal
5 Determine Possible Cause
6 Select Best Solution
7 Present the Solution
8 Monitor and Evaluate the Change
9 Continue the Improvement Process

Quality Improvement Team Flow Process



Team Identification

- Team Name
- Team Members
- Team Facilitator
- Team Leader
- Problem or Project Selection
- Team Mission
- Team Performance Criteria
- Team Meeting Minutes
- Team Progress
- Team Strengths & Weakness

Selection of Problem or Project

- Brainstorming
- Raw Data/Process Results
- Run Charts
- Gantt Charts
- Force-Field Analysis

Understanding Existing Conditions

- Flow Chart "As Is"
- Raw Data
- Checksheets
- Control Charts

Collect and Analyze Data

- Brainstorming
- Storyboarding
- Checksheets
- Cause & Effect Analysis
- Pareto Analysis
- Force-Field Analysis
- Process Improvement Chart

Develop Action Plan

Report Progress & Results

- Pareto Charts
- Pie Charts
- Histograms
- Run Charts

Present Improved Process

- Flow Chart "Should Be"
- Process Improvement Chart
- Presentation

Continue the Improvement Process

- Address Open Issues
- Shewart Cycle

TQC STORYBOARD

SYSTEMATIC PROBLEM SOLVING

1. PROJECT SELECTION

Objective:

To select a specific problem or process which needs improvement.

Possible Activities:

Select a significant issue. Possible sources of information about a significant issue may come from 1) customers, 2) management direction, or 3) the work group.

2. TEAM FORMATION

Objective:

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Possible Activities:

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3. PURPOSE STATEMENT

Objective:

To clarify the **purpose** of the project.
To determine **performance measures**.
To develop a tentative **timetable**.

Possible Activities:

In clarifying **project purpose:**

1. Identify stakeholders from whom you want to learn about needs and purposes.
2. Ask questions that expand purposes, for example:
   What are we really trying to do when we perform this activity?
   What are the purposes and needs of the customer?
   Is this problem part of a larger function?

In selecting **performance measures:**

1. Consider what the effects will be if the project is completely successful.
2. Determine a performance measure to track, based on the expected effects.

In developing a **timetable:**

1. Estimate the time required to complete the project.
2. If appropriate, review projected timetable with the team sponsor.

4. CURRENT SITUATION

Objective:

Understand and explain the problem or process being studied.

Possible Activities:

1. Find out about the problem. Go to the site of the problem. Talk to people familiar with it. Clarify and expand your understanding of the problem.
2. Check the recent results of the performance measure and graph them.
3. Determine an improvement target, as gauged by the process measurement.
4. Do not be concerned with possible solutions at this stage. Try to expand your understanding of the current situation.

Basic Problem Solving Tools Which May Be Helpful in the S.P.S. Process

STEPS \ BASIC TOOLS	BRAINSTORMING	NOMINAL GROUP TECHNIQUE	FLOW CHART	CAUSE & EFFECT DIAGRAM	CHECK SHEET	PARETO CHART	HISTOGRAM	RUN CHART	CONTROL CHART
CURRENT SITUATION			•		•	•	•	•	
ANALYSIS			•	•	•	•	•	•	•
IMPROVEMENT PLAN	•	•	•	•	•				
RESULTS			•		•	•	•	•	•
STANDARDIZATION			•	•	•				
REMAINING ISSUES	•	•		•	•	•			
LESSONS LEARNED	•	•							

5. ANALYSIS

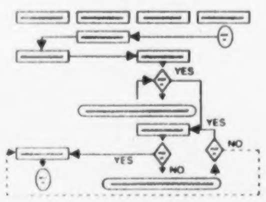
Objective:

Identify and verify the root causes of the problem.

Possible Activities:

1. Study the process flow.
2. Study cause and effect relationships. Ask who, what, where, when, why and how questions to pursue th root cause.
   Determine whether standard methods are in place. If o, are the people doing the work familiar with them? o they follow them? If not, why?
4. Collect and analyze the necessary data.
5. Use the Pareto Principle to set priorities (tackle the major causes first).
6. Run experiments to verify possible causes of problems.

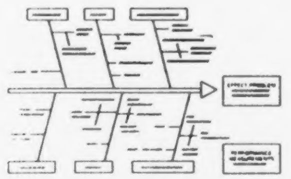
FLOW CHART



TIPS FOR USE

- Understand the purpose of the flow charting.
- Describe the process as it actually is.
- Involve the people who understand what is really happening in the process.
- The intended purpose will help you judge the level of detail.

CAUSE AND EFFECT



TIPS FOR USE

- Clearly define the effect for which causes must be identified.
- Determine how the effect can be measured.
- Use the chart as a "living document". Add notes and cards to the charts as you learn about potential causes.

6. IMPROVEMENT PLAN

Objective:

To propose improvements (countermeasures).
To select and test the most promising countermeasures.

Possible Activities:

1. Develop potential improvement actions, or countermeasures, based on the team's analysis.
2. Select the countermeasure(s) to be tested.
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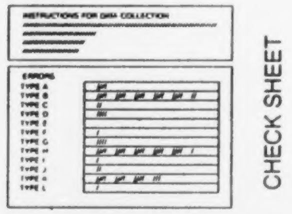
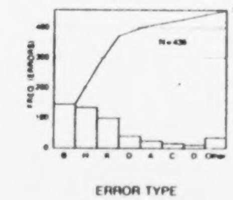


TIPS FOR USE

- Design the sheet to meet the specific needs of the data collection.
- Understand the data collection and their environment.
- Keep the form as simple as possible.
- Prepare instructions for the data collectors.
- Test the form and instructions.
- Audit the collection process and validate the results.

PARETO CHART



TIPS FOR USE

- Mark the chart clearly to show the unit of measurement ($, %, #, ...)
- Show the total of occurrences.
- Work with at least ten occurences; preferably many more.
- Don't stop after the first chart. Make a second-level chart of the major cause(s).

7. RESULTS

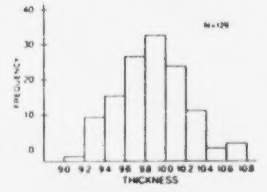
Objective:

To measure the effect of the countermeasure and compare the results to the improvement target.

Possible Activities:

1. Gauge the effects of the improvement actions by studying the performance measure. Has the target been met? If not, is there significant movement in the right direction?
2. If the results are not completely satisfactory, it may be necessary to initiate other countermeasures.
3. Consider the effects - good and bad - elsewhere in the system.

HISTOGRAM
(Part Thickness)



TIPS FOR USE

- The number of data points determines the number of groups on bars.

Points	Bars
Under 50	5-7
50-100	6-10
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- Clearly label the vertical and horizontal scales.
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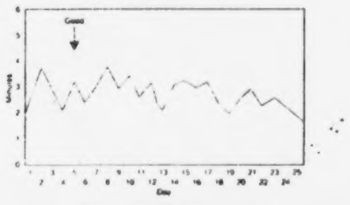
RUN CHART
(Minutes to Produce)



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- The time period covered and unit of measurement must be clearly marked
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Objective:

To assure that the effective improvement actions become a part of the regular routine of the process.

Possible Activities:

1. Identify what must be done to change the system permanently and make these changes.
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Objectives:

To list problems and issues which remain or were discovered as a result of this project.
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Objective:

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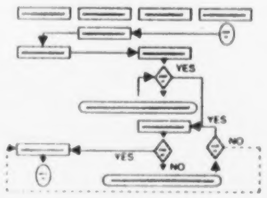
FLOW CHART



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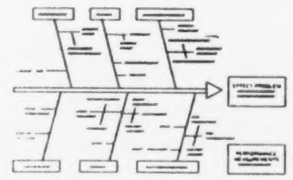

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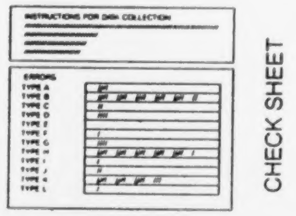

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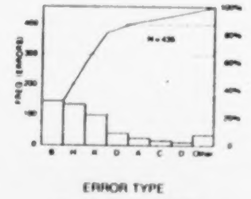

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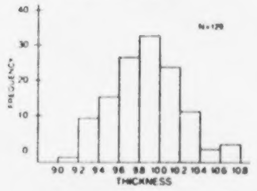

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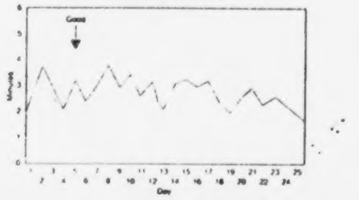

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Appendices

Appendix 1. The Fundamental Philosophies of the Three Quality Gurus

Dr. W. Edwards Deming

Following World War II, Dr. Deming was asked by the Union of Japanese Scientists and Engineers to share his views about using statistics to control quality. The century was fifty years old, as was the man. It was not until 1980 that the first American firm hired Dr. Deming to share the principles that he had given to the Japanese thirty years earlier. Dr. Deming estimates that it will take America about thirty years to match the Japanese record for quality improvement.

Although his emphasis is on the statistical means of reducing variation in production, Dr. Deming's famous "Fourteen Points of Management" (1986, p.23-24) reflect an equal concern for employees. They are as follows:[1]

1. Create constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs.
2. Adopt the new philosophy. We are in a new economic age. Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.
3. Cease dependence on inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.
4. End the practice of awarding business on the basis of price tag. Instead, minimize total cost. Move toward a single supplier for any one item, on a long-term relationship of loyalty and trust.

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[1] Reprinted from *Out of the Crisis*, by W. Edwards Deming, by permission of MIT and W. Edwards Deming. Published by MIT, Center for Advanced Engineering Study, Cambridge, MA 02139. Copyright 1986 by W. Edwards Deming. Reprinted with permission of MIT Press.

5. Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs.
6. Institute training on the job.
7. Institute leadership. The aim of supervision should be to help people and machines and gadgets to do a better job. Supervision of management is in need of overhaul, as well as supervision of production workers.
8. Drive out fear, so that everyone may work effectively for the company.
9. Break down barriers between departments. People in research, design, sales, and production must work as a team, to foresee problems of production and in use that may be encountered with the product or service.
10. Eliminate slogans, exhortations, and targets for the work force asking for zero defects and new levels of productivity. Such exhortations only create adversarial relationships, as the bulk of the causes of low quality and low productivity belong to the system and thus lie beyond the power of the work force.
11. a. Eliminate work standards (quotas) on the factory floor. Substitute leadership.
    b. Eliminate management by objective. Eliminate management by numbers, numerical goals. Substitute leadership.
12. a. Remove barriers that rob the hourly worker of his right to pride of workmanship. The responsibility of supervisors must be changed from sheer numbers to quality.
    b. Remove barriers that rob people in management and in engineering of their right to pride of workmanship. This means, *inter alia*, abolishment of the annual or merit rating and of management by objective.
13. Institute a vigorous program of education and self-improvement.
14. Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job.

Dr. Deming asserts that a system must be well-defined. The more complex the system, the more necessary the need for communication and support among the various components of the system. With this kind of teamwork, employees can make contributions and, thus, feel greater satisfaction with their jobs and with their organizations.

The larger and more complex the system, of course, the greater will be the opportunities to optimize the system. When systems are optimized, everyone profits. When there is suboptimization, everyone loses.

Optimization of the system and the accompanying improvement in productivity depends on reduction of the variability in processes. To bring about this decrease, the statistical control of processes is required. When variation occurs beyond predictable limits, the process is out of control. The reasons for excessive variation are either "common causes" or "special causes." The common causes

In addition to his implementation plan, Crosby encourages people to be "fanatics." Such people, he says, "leave footprints instead of just dust." To become a fanatic, he says (1989, p.104), you must:[3]

F First, decide you want a zero-defects strategy.

A Announce a clear, specific, quality policy.

N Next, display management commitment through action.

A Assure that everyone is educated so they can perform.

T Then eliminate opportunities to compromise conformance.

I Insist that every supplier do the same.

C Convince everyone that they are dependent on one another.

S Satisfy the customer, first, last, and always.

In the book, *Quality Is Free* (1979), Crosby tells us that:

> There is a theory of human behavior that says people subconsciously retard their own intellectual growth. They come to rely on cliches and habits. Once they reach the age of their own personal comfort with the world, they stop learning and their mind runs on idle for the rest of their days.
>
> They may progress organizationally, they may be ambitious and eager, and they may even work night and day. But they learn no more. The bigoted, the narrow-minded, the stubborn, and the perpetually optimistic have all stopped learning. (p.68)

Again, we hear in his words an inspiration to do things differently...not just for the sake of being different but for the sake of improving the quality of our products and the quality of our work life. As Crosby is fond of noting, it takes only one person to lead the parade.

"When you look at where the real needs are in new quality systems, the irony emerges: The problems with high-technology systems are found in low-technology areas: human behavior. The focus and effort of most companies is...on new technical methods, while the greatest need remains in the management practice area. Expenditures follow this pattern where five dollars are spent on technical and systems training for every dollar spent on management practices training. This is a reversal of the Pareto Principle, with the least resource going to the most critical issue."[4]

—Roland A. Dumas

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[3] Reprinted from *Let's Talk Quality*, by Philip B. Crosby, New York: McGraw-Hill, 1989. Reprinted with permission of the author.

[4] Reprinted from *Total Quality Handbook: The Executive Guide to the New American Way of Doing Business*, compiled by George Dixon and Julie Swiler, Minneapolis, MN: Lakewood Books, 1990. Reprinted with permission of Roland A. Dumas.

Dr. Joseph Juran

Dr. Juran was awarded The Order of the Sacred Treasure by Emperor Hirohito "for the development of quality control in Japan and the facilitation of U.S. and Japanese friendship." This award is the highest honor that Japan can bestow on non-native individuals. In many ways, Dr. Juran's message parallels Dr. Deming's. He, too, feels that top management has the obligation to elevate the corporate levels of quality. Top management cannot, he insists, shift the responsibilities to the shoulders of subordinates. Like Dr. Deming, Dr. Juran disdains exhortations and the ephemeral efforts of the indiscriminately hired consultant. He distinguishes between "leading" and "cheerleading" and warns that senior managers must do much more than they are now doing if they wish to help their product or service organizations to meet standards of world-class quality.

The International Standardization Organization has listed these requirements for the products or services of successful organizations:[5]

- meet a well-defined need, use, or purpose;
- satisfy customers' expectations;
- comply with applicable standards and specifications;
- comply with statutory (and other) requirements of society;
- are made available—at competitive prices;
- are provided at a cost that will yield a profit.

Ten Steps for Implementing Quality Improvements

Dr. Juran lists ten steps for implementing quality improvements:[6]

1. Build awareness of the need and opportunity for improvement.
2. Set goals for improvement.
3. Organize to reach the goals (establish a quality council, identify problems, select projects, appoint teams, designate facilitator).
4. Provide training.
5. Carry out projects to solve problems.
6. Report progress.
7. Give recognition.

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[5] Reprinted with permission of the American Society for Quality Control (ASQC), Milwaukee, Wisconsin.

[6] Reprinted from *Total Quality Management Workshop* (p. A-10), January, 1991, published by U.S. Office of Personnel Management, Management Training Institute, Dallas, TX.

8. Communicate results.
9. Keep score.
10. Maintain momentum by making annual improvement part of the regular systems and processes of the company.

Dr. Juran encourages us to think about quality on two levels: "fitness for use" and "conformance to specification." A given product could meet all the specifications that the manufacturer has established for it and yet not be fit for use. Dr. Juran also points out that quality can cost *both* more and less: more if we are willing to pay for the quality of a Cadillac as opposed to the quality of a Hyundai, and less if we are using quality methods to reduce waste within our organizations.

Dr. Juran says that a manager who is serious about attaining world-class quality should do the following:[7]

- Undergo training in how to think about quality, how to plan for quality, and how to measure improvement.
- Take a leading and permanent role in creating the quality-improvement program.
- Make the organizational changes necessary to meet these policies and goals. (The traditional sequence of product development must be replaced by cross-functional efforts. "Department turf wars," he declares, "must be eliminated."
- Personally review and reward performance.

The switch in mind-set from competition to cooperation may be very difficult for some managers. Others may give the new focus lip service but not much more. We hope that *you,* however will become an instrument for positive change in your own organization. Your willingness to look—from a new perspective—at how work is done will help to ensure your success.

> "The first and obvious thing is that satisfaction of the customer is critical in all aspects of Quality. All the gurus and all the approaches end up with customer orientation as the absolute driving force."
>
> —Carl G. Thor

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[7] From "How To Manage for World Class Quality," *Boardroom Reports,* May 1, 1990. Excerpted with the permission of *Boardroom Reports,* 330 West 42nd Street, New York, NY 10038.

Appendix 2. The Malcolm Baldrige National Quality Award

Named after the former Secretary of Commerce, the Baldrige Award was established as Public Law 100-107 by President Ronald Reagan on August 20, 1987. The award is designed to increase quality awareness among American firms, to recognize the improvements made by such firms, and to facilitate sharing of the success stories and successful procedures used by various companies.

The Baldrige examiners use a 1000-point scale to rate applicants in the categories that are described below.[1]

1.0 Leadership (100 points)

The Leadership category is designed to evaluate how the senior executives create and sustain a clear and visible quality value system along with a supporting management system to guide all activities of the company toward quality excellence. Also examined are the senior executives' and the company's quality leadership in the external community and how the company integrates its public responsibilities with its quality values and practices.

2.0 Information and Analysis (60 points)

Under the Information and Analysis category, the examiners look at the scope, validity, use, and management of the data and information that underlie the company's total quality management system. Also examined is the adequacy of the data and information to support a responsive prevention approach to quality based on "management by fact."

3.0 Strategic Quality Planning (90 points)

The Strategic Quality Planning category is to examine the company's planning process for retaining or achieving quality leadership and how the company integrates quality-improvement planning into overall business planning. Also examined are the company's short-term and longer-term priorities to achieve and/or sustain a quality leadership position.

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[1] The *1992 Award Criteria* is a publication of the National Institute of Standards of Technology; as a publication of the U.S. Government, it is not subject to copyright protection.

4.0 Human Resource Utilization (150 points)

The Human Resource Utilization category focuses on the effectiveness of the company's efforts to develop and realize the full potential of the work force, including management, and to maintain an environment that is conducive to full participation, quality leadership, and personal and organizational growth.

> "Quality is the key to making American products. We are in the midst of a technological revolution, and our work to build quality products will be a crucial link to the long-term success of the United States in the global marketplace."
>
> —President George Bush

5.0 Quality Assurance of Products and Services (150 points)

The Quality Assurance of Products and Services category permits examination of the systematic approaches used by the company for the total quality control of goods and services based primarily on process design and control, including control of procured materials, parts, and services. Also examined is the integration of quality control with continuous quality improvement.

6.0 Quality Results (150 points)

The Quality Results category focuses on quality levels and quality improvement based on objective measures derived from analysis of customer requirements and expectations as well as from analysis of business operations. Also examined are current quality levels in relation to those of competing firms.

7.0 Customer Satisfaction (300 points)

Under the Customer Satisfaction category, the examiners investigate the company's knowledge of the customer, its overall customer-service systems, their responsiveness, and their ability to meet requirements and expectations. Also examined are current levels of and trends in customer satisfaction.

Appendix 3. The Presidential Award for Quality and the Quality Improvement Prototype (QIP) Award

The Federal Quality Awards Program, administered by the Federal Quality Institute, gives two awards annually to Federal organizations that have successfully implemented total quality management: the Presidential Award for Quality and the Quality Improvement Prototype (QIP) Award. These are the Federal sector's equivalent of the Baldrige Award. The first purpose of these awards is to recognize Federal organizations that have implemented TQM in an exemplary manner, resulting in high-quality products and services and the effective use of taxpayer dollars. The second purpose is to use winners as models for other Federal organizations in order to encourage and facilitate the implementation of TQM throughout the Federal Government.

The Federal Quality Awards Program grew out of the President's Quality and Productivity Improvement Program, which required agencies to develop strategies for improving the quality, productivity, timeliness, and cost effectiveness of major Federal programs. Since their inception in 1988, the processes for both award programs have become more sophisticated. In 1990, a structured evaluation process was created, patterned after those used for the George Westinghouse Total Quality Awards and the Baldrige Award. Examiners and judges were selected from public- and private-sector organizations. In 1991, the awards criteria, scoring guidelines, and evaluation process were refined further.

Awards Process

Application Evaluation

Applications are evaluated by small teams of examiners. Each examiner reads an application and completes a detailed scoring process individually. Then the examination team must reach consensus on the score and the supporting comments. The last step is to list issues that must be resolved during a site visit.

Site Visits

FQI award administrators determine the finalist organizations and specific sites to be visited. Teams of examiners conduct the site visits to validate the information in the application, collect additional information, and resolve questions. They then prepare a report and confirm or adjust the score originally given.

Final Judging

A panel of judges selects the award winners, based on the applications, consensus scoring, and site-visit reports. The judges must agree on a standard of excellence and compare each finalist to it. The judges must agree on no more than six QIP Award winners or two Presidential Award winners.

Winners' Roles

In order to fulfill the purposes of the awards program—recognition and education—winners write case studies that detail their award-winning efforts. They also produce videotapes that highlight their accomplishments. The awards are given at the Annual Conference on Federal Quality held in Washington, D.C., in the spring. The case studies and videotapes are debuted, and the award winners make presentations. Then both the case studies and the videotapes are disseminated widely to help to educate other organizations.

The Presidential Award

The following sections describe the categories considered by the President's Award panel.

1. Top Management Leadership and Support (20 points)

This category permits assessment of how all levels of senior management create and sustain a clear and visible quality value system along with a supporting management system to guide all activities of the organization.

2. Strategic Planning (15 points)

Under this category, the panel examines the extent to which quality considerations are taken into account in the planning process.

3. Focus on the Customer (40 points)

This category raises questions about the organization's overall customer-service systems, knowledge of the customer, responsiveness, and ability to meet requirements and expectations.

4. Employee Training and Recognition (15 points)

In this category, the panel looks at the organization's efforts to develop and utilize the full potential of the work force for quality improvement and personal and organizational growth, as well as its efforts to use rewards and incentives to recognize employees who improve quality and productivity.

5. Employee Empowerment and Teamwork (15 points)

In this category, the panel examines the effectiveness and thoroughness of employee involvement in TQM.

6. Measurement and Analysis (15 points)

This category focuses on the scope, validity, use, and management of data and information that underlie the organization's TQM system and how the data are used to improve processes, products, and services.

7. Quality Assurance (30 points)

In this category, the panel examines the systematic approaches used by the organization for total quality control of products and services and the integration of quality control with continuous quality improvement.

8. Quality and Productivity Improvement Results (50 points)

This category permits examination of the measurable and verifiable results of the organization's TQM practices. Data tables and graphs that summarize trends and achievement are utilized as much as possible.

The following are the past winners of the Presidential Award for Quality:

- 1989: Naval Air Systems Command, Department of Navy, Washington, D.C.;
- 1990: none;
- 1991: Air Force Logistics Command, Department of Air Force, Wright Patterson Air Force Base, Ohio;
- 1992: Ogden Service Center, Internal Revenue Service, Ogden, Utah.

The Quality Improvement Prototype (QIP) Awards

The criteria for the QIP and Presidential Awards are very similar. More information is required for the Presidential Award, and applicants are expected to demonstrate improvement over a longer period of time. The following are the past winners of the Quality Improvement Prototype (QIP) Awards:

1988:

- Federal Tax Deposit System, Internal Revenue Service;
- Cherry Point Naval Aviation Depot, Department of Navy;
- Equal Employment Opportunity Commission;
- One-Stop Account Service, Internal Revenue Service.

1989:

- Odgen Service Center, Internal Revenue Service;
- Norfolk Naval Shipyard, Department of Navy;
- Fresno Service Center, Internal Revenue Service;
- Lewis Research Center, National Aeronautics and Space Administration;
- Kansas City Veterans Medical Center, Department of Veterans Affairs;
- Naval Publications and Forms Center, Department of Navy.

1990:

- Defense Industrial Supply Center, Defense Logistics Agency;
- Johnson Space Center, National Aeronautics and Space Administration;
- Cincinnati Service Center, Internal Revenue Service.

1991:

- Sacramento Air Logistics Center, Department of Air Force;
- 1926th Communications-Computer Systems Group, Department of Air Force.

1992:

- VA Regional Office and Insurance Center, Department of Veterans Affairs, Philadelphia, Pennsylvania;
- Public Services and Administration, Patent and Trademark Office, Department of Commerce, Arlington, Virginia;
- San Francisco Region, Wage and Hour Division, Employment Standards Administration, Department of Labor;
- Aeronautical Systems Division, Air Force Systems Command, Department of Air Force, Wright-Patterson Air Force Base, Ohio;
- Defense Contract Management District Northeast, Defense Logistics Agency, Boston, Massachusetts.

"We were doing TQM here before TQM had a name. The reason is that we had certain problems that were not textbook problems. We had to figure out a way to solve them since solutions were not in the book.

"For example, we had a contractor with a backlog of deliveries to the government and this delivery problem had been going on for years. Ordinarily, we had been doing a policing action or compliance review, issuing report cards saying you are not doing well enough. We would identify his problem but not help him to solve it.

"We began taking an unconventional but successful approach at about the same time that Quality principles were gaining wide acceptance. Our way of turning around a contractor with such a history of long-term problems was to work with him, not against him.

"Today, with TQM principles behind us, we help solve instead of simply identifying and then walking away, leaving the contractor to solve his own problems. We stay, in fact, until the problem is solved. We roll up our sleeves and get dirty right along with the contractor if need be. We now view ourselves as being part of the solution."

—Colonel Dale A. Misner

MANAGING / COVER STORY

WHO NEEDS A BOSS?

Not employees who work in self-managed teams. They arrange schedules, buy equipment, fuss over quality—and dramatically boost the productivity of their companies. ■ *by Brian Dumaine*

MANY AMERICAN companies are discovering what may be *the* productivity breakthrough of the 1990s. Call the still-controversial innovation a self-managed team, a cross-functional team, a high-performance team, or, to coin a phrase, a superteam. Says Texas Instruments CEO Jerry Junkins: "No matter what your business, these teams are the wave of the future." Corning CEO Jamie Houghton, whose company has 3,000 teams, echoes the sentiment: "If you really believe in quality, when you cut through everything, it's empowering your people, and it's empowering your people that leads to teams.

We're not talking here about the teamwork that's been praised at Rotary Club luncheons since time immemorial, or the quality circles so popular in the 1980s, where workers gathered once a week to save paper clips or bitch about the fluorescent lights. What makes superteams so controversial is that they ultimately force managers to do what they had only imagined in their most Boschian nightmares: give up control. Because if superteams are working right, *mirabile dictu*, they manage themselves. No boss required. A superteam arranges schedules, sets profit targets, and—gulp—may even know everyone's salary. It has a say in hiring and firing team members as well as managers. It orders material and equipment. It strokes customers, improves quality, and, in some cases, devises strategy.

Superteams typically consist of between three and 30 workers—sometimes blue collar, sometimes white collar, sometimes both. In a few cases, they have become a permanent part of the work force. In others, management assembles the team for a few months or years to develop a new product or solve a particular problem. Companies that use them—and they work as well in service or finance businesses as they do in manufacturing—usually see productivity rise dramatically. That's because teams composed of people with different skills, from different parts of the company, can swoop around bureaucratic obstacles and break through walls separating different functions to get a job done.

CHEERING ON THE TEAM

If Harvard awarded MBAs to factory workers for their expertise, this team at a General Mills cereal plant in Lodi, California, would graduate with honors. They do just about everything middle managers do, and do it well: Since General Mills introduced teams to the plant, productivity has risen up to 40%. Carmen Gomez, Ruby Liptack, and Bill Gerstner (extreme left to right) operate machinery to make cereal (that's Oatmeal Crisp). Denny Perak (in the middle) is a manager, but he doesn't supervise in the traditional sense. He coaches the team on management techniques and serves as their link with headquarters. Donald Owen and William Walker (on the right) help maintain the machinery, which Irma Hills operates. Team members like the added responsibility, but also feel more pressure. Says Owen: "I work a lot harder than I used to. You have to worry about the numbers."

Ten years ago there were practically no superteams. Only a handful of companies—Procter & Gamble, Digital Equipment, TRW—were experimenting with them. But a recent survey of 476 FORTUNE 1,000 companies, published by the American Productivity & Quality Center in Houston, shows that while only 7% of the work force is organized in self-managed teams, half the companies questioned say they will be relying significantly more on them in the years ahead. Those who have already taken the plunge have seen impressive results:

■ At a General Mills cereal plant in Lodi, California, teams such as the one pictured on FORTUNE's cover schedule, operate, and maintain machinery so effectively that the factory runs with no managers present during the night shift.

■ At a weekly meeting, a team of Federal Express clerks spotted—and eventually solved—a billing problem that was costing the company $2.1 million a year.

■ A team of Chaparral Steel mill workers traveled the world to evaluate new production machinery. The machines they selected and installed have helped make their mill one of the world's most efficient.

■ 3M turned around one division by creating cross-functional teams that tripled the number of new products.

■ After organizing its home office operations into superteams, Aetna Life & Casualty reduced the ratio of middle managers to workers—from 1 to 7 down to 1 to 30—all the while improving customer service.

■ Teams of blue-collar workers at Johnsonville Foods of Sheboygan, Wisconsin, helped CEO Ralph Stayer make the decision to proceed with a major plant expansion. The workers told Stayer they could produce more sausage, faster than he would have ever dared to ask. Since 1986, productivity has risen at least 50%.

Like latter-day Laocoons, the companies using superteams must struggle with serpentine problems. How do you keep a team from veering off track? How should it be rewarded for inventing new products or for saving money? How much spending authority should a team have? What happens to the opportunity for team members to advance as the corporate hierarchy flattens? How should disputes among its members be resolved? Answers vary from company to company. Read on to see how some organizations are coping.

Superteams aren't for everyone. They make sense only if a job entails a high level of dependency among three or more people. Complex manufacturing processes common in the auto, chemical, paper, and high-tech industries can benefit from teams. So can complicated service jobs in insurance, banking, and telecommunications. But if the work consists of simple assembly line activity like stuffing pimentos into olives, teams probably don't make sense. Says Edward Lawler, a management professor at the University of Southern California: "You have to ask, 'How complex is the work?' The more complex, the more suited it is for teams."

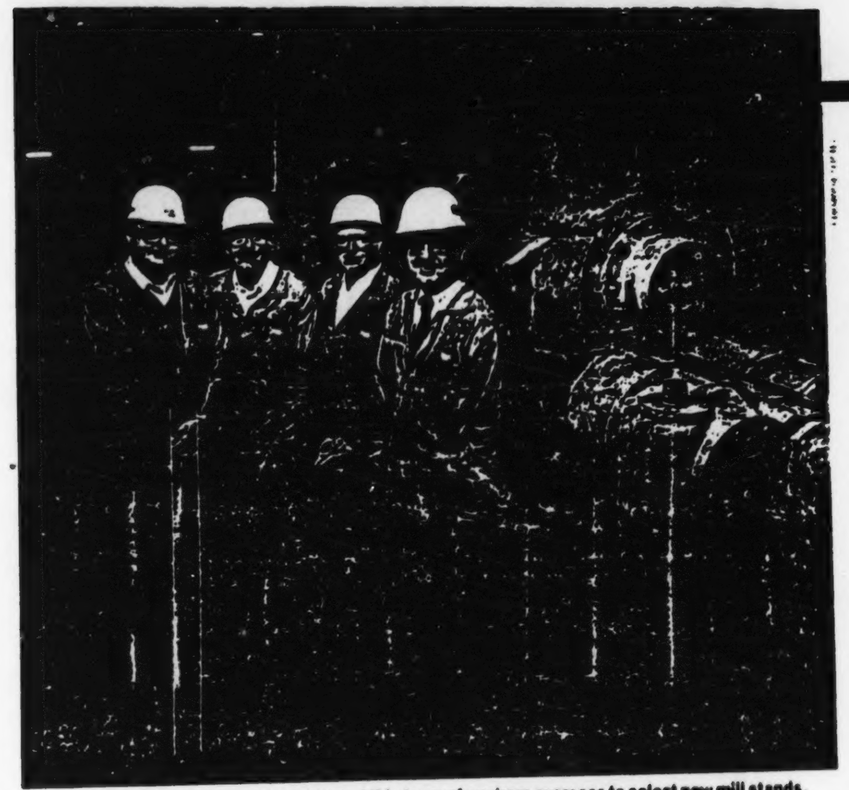
Lawler is getting at the heart of what makes superteams tick: cross-functionalism, as the experts inelegantly put it. The superteam draws together people with different jobs or functions—marketing, manufacturing, finance, and so on. The theory is that by putting their heads together, people with different perspectives on the business can solve a problem quickly and effectively.

An enthusiastic team player, Johnsonville Foods CEO Ralph Stayer (second from left) gets workers on the shop floor to help forge corporate strategy.

REPORTER ASSOCIATE [illegible]

PHOTOGRAPHS BY STEVE WOIT

BEST COPY AVAILABLE



Chaparral CEO Gordon Forward (right) sent this team of workers overseas to select new mill stands.

Contrast that to the Rube Goldberg approach a hierarchical organization would usually take. A person with a problem in one function might have to shoot it up two or three layers by memo to a vice president who tosses it laterally to a vice president of another function who then kicks it down to the person in his area who knows the answer. Then it's back up and down the ladder again. Whew.

FEDERAL EXPRESS has been particularly successful using superteams in its back-office operations in Memphis. Two years ago, as part of a companywide push to convert to teams, Fedex organized its 1,000 clerical workers into superteams of five to ten people, and gave them the training and authority to manage themselves. With the help of its teams, the company cut service glitches, such as incorrect bills and lost packages, by 13% in 1989.

At lunch with one team, this reporter sat impressed as entry-level workers, most with only high school educations, ate their chicken and dropped sophisticated management terms like *kaizen*, the Japanese art of continuous improvement, and [illegible] a form of problem solving that requires workers to take a logical step-by-step approach. The team described how one day during a weekly meeting, a clerk from quality control pointed out a billing problem. The bigger a package, he explained, the more Fedex charges to deliver it. But the company's wildly busy delivery people sometimes forgot to check whether customers had properly marked the weight of packages on the air bill. That meant that Fedex, whose policy in such cases is to charge customers the lowest rate, was losing money.

The team switched on its turbochargers. An employee in billing services found out which field offices in Fedex's labyrinthine 30,000-person courier network were forgetting to check the packages, and then explained the problem to the delivery people. Another worker in billing set up a system to examine the invoices and make sure the solution was working. Last year alone the team's ideas saved the company $2.1 million.

In 1987, Rubbermaid began to develop a so-called auto office, a plastic portable device that straps onto a car seat. It holds files, pens, and other articles and provides a writing surface. The company assembled a cross-functional team composed of, among others, engineers, designers, and marketers, who together went into the field to ask customers what features they wanted. Says Rubbermaid vice president Lud Huck: "A designer, an engineer, and a marketer all approach research from a different point of view."

Huck explains that while a marketer might ask potential customers about price, he'd never think to ask important design questions. With contributions from several different functions, Rubbermaid brought the new product to market last year. Sales are running 50% above projections.

Companies making the move to superteams often discover middle managers who feel threatened, and refuse—even for a millisecond—to think outside their narrow functional specialties, or chimneys, as they're labeled at some companies. Understandable, since the managers probably made it to where they are by being marketing whizzes or masters of the bean-counting universe. Why help some poor slob in engineering? For superteams to work, functional chimneys must be broken down and middle managers persuaded to lend their time, people, and resources to other functions for the good of the entire corporation.

Robert Hershock, a group vice president at 3M, is an expert chimney breaker. In 1985 he introduced teams to his division, which makes respirators and industrial safety equipment, because it was desperately in need of new products. The old boss had simply told his underlings what to develop. R&D would sketch it up and deliver the concept to sales for comment, leaving manufacturing and marketing scrambling to figure out how to make or position the new offering. Says Hershock: "Every function acted as if it didn't need anyone else."

He formed an operating team made up of himself and six top managers, each from a different function. With suggestions from all interested parties, he hoped to chart new-product strategies that everyone could get behind. Under the operating team he established self-managed "action teams," each with eight to ten people, again from different functions. They were responsible for day-to-day development of products.

It wasn't all sweetness

> **"Managers need to allow their teams to kick people off who aren't carrying their own weight."**

light. Hershock says one manager on the operating team dragged his feet all the way. "He'd say he wasn't in favor of this or that," recalls Hershock. "He'd say to his people, 'Meet with the action teams because Hershock said so, but don't commit to anything. Just report back to me what was said.'" Hershock worked to convince the man of the benefits of the team approach, but to no avail. Eventually the manager went to Hershock and said, "I didn't sleep all weekend. I'm upset." The manager found a good job in another division. "You need to have a sense of who's not buying in and let the teams kick people off who aren't carrying their weight," Hershock concludes. Today his division is one of 3M's most innovative and fastest growing.

IT'S EASIER to build superteams into a new office or factory than to convert an old one to them. When an operation is just starting up, a company can screen people carefully for educational skills and the capacity to work on a team, and can train them without worrying about bad old work habits like the "it's not my problem" syndrome. Nonetheless, General Mills is organizing superteams in all its existing factories. Randy Darcy, director of manufacturing, says transforming an old plant can take several years, vs. only a year to 18 months for a new plant. Says Darcy: "It costs you up front, but you have to look at it as a capital project. If you consider the productivity gains, you can justify it on ROE."

Can you ever. General Mills says productivity in its plants that use self-managed teams is as much as 40% higher than at its traditional factories. One reason is that the plants need fewer middle managers. At one of General Mills' cereal plants in Lodi, workers on the night shift take care of everything from scheduling to maintenance. The company has also found that superteams sometimes set higher productivity goals than management does. At its Carlisle, Pennsylvania, plant, which makes Squeezit juice, superteams changed some equipment and squeezed out a 5% production increase in a plant management thought was already running at full capacity.

But you will never get large productivity gains unless you give your teams real authority to act. This is a theme that Johnsonville's Stayer, who teaches a case on teams at the Harvard business school, preaches with messianic zeal. "The strategic decision," he explains, "is who makes the decision. There's a lot of talk about teamwork in this country, but we're not set up to generate it. Most quality circles don't give workers responsibility. They even make things worse. People in circles point out problems, and it's someone else's problem to fix."

In 1986 a major food company asked Johnsonville to manufacture sausage under a private label. Stayer's initial reaction was to say no, because he thought the additional volume would overload his plant and force his people to work grueling hours. But before declining, he assembled his 200 production workers, who are organized in teams of five to 20, and asked them to decide whether *they* wanted to take on the heavier workload. Stayer discussed the pros: Through economies of scale, the extra business would lower costs and thus boost profits; since everyone's bonus was based on profitability, everyone would make more money. And the cons: long hours, strained machinery, and the possibility of declining quality.

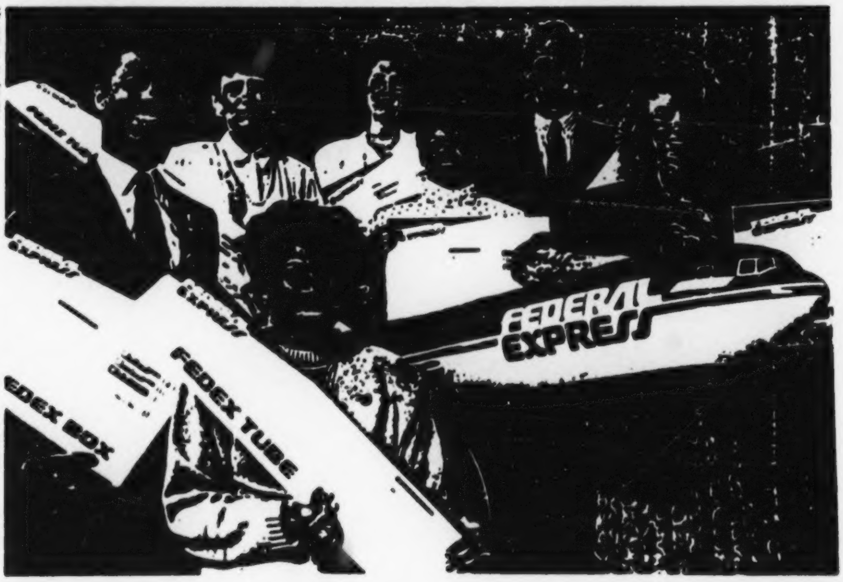
"We learn more in teams, and it's more fun to work in teams. It's good to know someone is using your ideas."

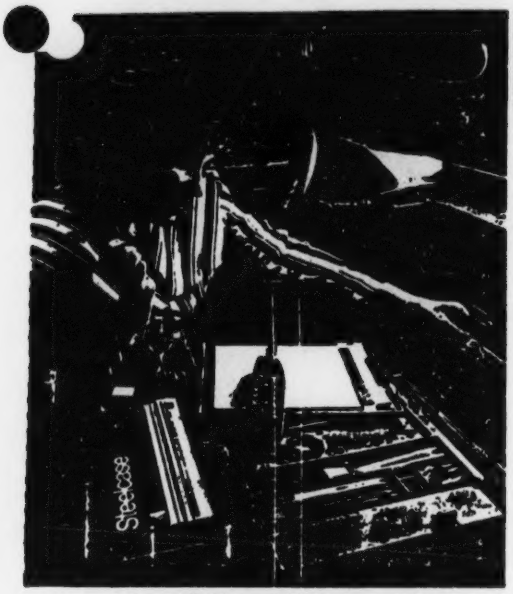
After the teams deliberated for ten days, they came back with an answer: "We can do it. We'll have to work seven days a week at first, but then the work will level off." The teams decided how much new machinery they would need and how many new people; they also made a schedule of how much to produce per day. Since Johnsonville took on the new project, productivity has risen over 50% in the factory. Says Stayer: "If I had tried to implement it from above, we would have lost the whole business."

Some large organizations still feel a need to exercise oversight of superteams' activities. What to do with a team that louses up quality or orders the wrong machinery? James Watson, a vice president of Texas Instruments' semiconductor group, may have the answer. At one of TI's chip factories in Texas, Watson helped create a hierarchy of teams that, like a shadow government, works within the existing hierarchy.

On top is a steering team consisting of the plant manager and his heads of manufacturing, finance, engineering, and human resources. They set strategy and approve large projects. Beneath the steering team, TI has three other teams: corrective-action teams, quality-improvement teams, and effectiveness teams. The first two are cross-functional and consist mainly of middle managers and professionals like engineers and accountants. Corrective-action teams form to tackle short-lived problems and then disband. They're great for those times when, as the technophantasmic novelist

Why are these clerks smiling? On their own, they found a way to save Federal Express $2.1 million.





A team of Rubbermaid designers, marketers, and engineers developed this portable car office.

Thomas Pynchon writes, there's fecoventilatory collision: the s— hits the fan.

By contrast, TI's quality-improvement teams work on long-term projects, such as streamlining the manufacturing process. The corrective-action and quality-improvement teams guide and check effectiveness teams, which consist of blue-collar employees who do day-to-day production work, and professional workers.

What's to keep this arrangement from becoming just another hierarchy? "You have to keep changing and be flexible as business conditions dictate," says Watson. He contends that one of the steering team's most important responsibilities is to show a keen interest in the teams beneath it. "The worst thing you can do to a team is to leave it alone in the dark. I guarantee that if you come across someone who says teams didn't work at his company, it's because management didn't take interest in them." Watson suggests that the steering team periodically review everyone's work, and adds, "It doesn't have to be a big dog-and-pony show. Just walk around and ask, 'How are you doing?' "

Last spring a group of executives from a FORTUNE 500 manufacturer traveled to Midlothian, Texas, to learn how Chaparral Steel managed its teams. Efficient superteams have helped make Chaparral one of the world's most productive steel companies. During the tour, one executive asked a Chaparral manager, "How do you schedule coffee breaks in the plant?"

"The workers decide when they want a cup of coffee," came the reply.

"Yes, but who tells them when it's okay to leave the machines?" the executive persisted.

Looking back on the exchange, the Chaparral manager reflects, "The guy left and still didn't get it."

Why do Chaparral workers know when to take a coffee break? Because they're trained to understand how the whole business operates. Earl Engelhardt, who runs the company's educational program, teaches mill hands "The Chaparral Process," a course that not only describes what happens to a piece of steel as it moves through the company, but also covers the roles of finance, accounting, and sales. Once trained, a worker understands how his job relates to the welfare of the entire organization. At team meetings, many of which are held in the company's modest boardroom, talk is of backlogs and man-hours per ton. Financial statements are posted monthly in the mill, including a chart tracking operating profits before taxes—the key measure for profit sharing.

In the early 1980s the company sent a team leader and three millworkers, all of whom had been through "The Chaparral Process," to Europe, Asia, and South America to evaluate new mill stands. These large, expensive pieces of equipment flatten and shape hot steel as it passes through the mill, much as the rollers on old washing machines used to wring clothes. After team members returned from their first trip, they discussed the advantages and disadvantages of various mill stands with other workers and with top management. Then they narrowed the field and flew off again. Eventually the team agreed on the best mill stand—in this case a West German model—and top management gave its blessing.

"I guarantee when someone says teams didn't work, it's because management didn't take an interest."

The team then ordered the mill stands and oversaw their installation, even down to negotiating the contracts for the work involved. At other companies it can take as long as several years to buy and install such a complicated piece of equipment. The Chaparral team got the job done in a year. Perhaps even more amazing, the mill stands—notoriously finicky pieces of machinery—worked as soon as they were turned on.

There remains considerable debate among employees, managers, and consultants over the best way to compensate team members. Most companies pay a flat salary. And instead of handing out automatic annual raises, they often use a pay-for-skills system that bases any increase not on seniority but on what an employee has learned. If, say, a steelworker learns how to run a new piece of equipment, he might get a 5% raise.

WHILE THE YOUNG and eager tend to do well with pay-for-skills, some old-school blue-collar workers like Chaparral Steel's Neil Parker criticize aspects of the system. Says he: "New guys come in who are aggressive, take all the courses, and get promoted ahead of guys who have been here years longer and who showed up for overtime when the company really needed us. It's not fair." As Parker suggests, pay-for-skills does set up a somewhat Darwinian environment at the mill, but that's just the way Chaparral's management likes it.

When teams develop a hot new product, like Rubbermaid's auto office, or save money, like the Federal Express team that caught $2.1 million in billing errors, you would think they would clamor for rewards. Not necessarily. In many cases, surprisingly, a little recognition is reward enough. The Fedex team members seem perfectly content with a gold quality award pin and their picture in the company newsletter. Says one: "We learn more in teams, and it's more fun to work in teams. It's a good feeling to know someone is using your ideas."

In his book *Managing New Products*, Thomas Kuczmarski, a consultant to many of the FORTUNE 500 industrials, argues that recognition isn't enough. "In most companies multidisciplinary teams are just lip service because companies don't provide the right motivation and incentive. Most top managers think people should just find 20% more time to work on a new team project. It's a very naive and narrow-minded approach." His modest proposals: If a new product generates $1 million in profits, give each of the five team members $100,000 the first year. □

have each member write a check for $10,000 in return for 2% of the equity in the new product. If it flies they're rich; if it flops they lose their money.

Kuczmarski admits that no major corporation has adopted his provocative system, although he says a few are on the verge of doing so. One objection: Jack Okey, a Honeywell team manager, flatly states that it would be bad for morale to have, say, a junior engineer making more than a division vice president. "If you want to be an entrepreneur, there are plenty of entrepreneurial opportunities outside the company. You can have entrepreneurial spirit without entrepreneurial pay."

PERHAPS. Awards dinners and plaques for jobs well done are common in the world of teams, but Texas Instruments vice president James Watson thinks more can be done. He cites the example from Japan, where there is a nationwide competition among manufacturers' teams. Sponsored by the Union of Japanese Scientists and Engineers, the competition pits teams selected by their companies against one another. Once a year the teams travel to Tokyo to make presentations before judges, who decide which performs best at everything from solving quality problems to continuously improving a manufacturing process. The winners get showered with prizes and media coverage.

Sometimes, despite everyone's best efforts, teams get hung up. Leonard Greenhalgh, a professor of management at Dartmouth's Tuck School, says the most common problem is the failure by team members to understand the feelings and needs of their co-workers. At GTE's training center in Connecticut, Greenhalgh had middle managers do role-playing to bring out how such problems can creep up. In a fictionalized case, a team of six pretended they were Porsche managers who had to set next year's production schedule. Each was given a different function and agenda. The Porsche sales manager, for instance, wanted to manufacture more of the popular Carrera convertibles, but the general counsel thought it a bad idea because of the liability problems generally associated with convertibles.

The GTE managers spent several hours arriving at a consensus. Says Greenhalgh: "Typically, a team lacks skills to build a strong consensus. One coalition tries to outvote the other or browbeat the dissenters." To make sure everyone is on board, says Greenhalgh, it's important that each team member feel comfortable airing his opinions. But that can take some training for all group members in how to respond.

"If a team is operating well, I hear less talk about no opportunity for promotion and more about the product."

For instance, the GTF ers learned it's bette blurt out an intimidating. disagree," but rather, "Th an interesting way to look a what about this?"

Companies using te sometimes run into anot problem: With fewer mid manager positions arou there's less opportunity for vancement. The experts say need to emphasize that bec team members have more sponsibility, their work is m rewarding and challeng Harvard business school pro sor Anne Donnellon, who is ing a major new study of teams, sees approach already working at some FORT 500 companies: "People are adjusting to reer-ladder shortening. If a team is opera well, I hear less talk about no opportunity promotion and more about the product the competition. They're focusing on ge the work done. After all, people want warding work."

If you've done all you can think of, your team is still running on only inders, you might consider som prosaic as changing the office Aetna Life recently reorganized its hom fice operations into self-managed tean combining clerks, technical writers, un writers, and financial analysts—to ha customer requests and complaints. To f tate teamwork, Aetna is using a new lin "team" furniture designed by Steelcas

The furniture establishes small area the folks at Steelcase call neighborho central work area with a table lets t meet when they need to, while nearby d provide privacy. Says William Watson Aetna senior vice president: "I can't tell how great it is. Everyone sits together. the person responsible for accounting k who prepares the bills and who puts the cy information in the computers to pa claims. You don't need to run aroun building to get something done."

The most important thing to reme about teams is that organizing them long, hard process, not a quick fix th change your company in a few weeks Johnsonville's Stayer: "When I starte business of teams, I was anxious to done and get back to my real job alized that, hey, this is my real jo the teams loose. For those up lenge, there will be real results el

Aetna installed this new line of Steelcase furniture to create homey "neighborhoods" of workers.

match, ask what happens if the person you hire doesn't work out. Will the firm help you find a replacement for free or at a discount rate? The practice varies, so make sure you specify the procedure at the start.

If all goes well, hiring a good headhunter offers one final personal benefit. If and when you need to look for a job yourself, you'll know a friendly headhunter to call for some timely advice. —DIANE COLE

Revolving Door Jobs: How to Beat the Odds

Your new job seems a wonderful promotion until you discover that it's been a revolving door for several of your predecessors, who've either quit or been fired. Unless you want to become a part of the job's ominous history, you need to find out why. But how should you go about investigating such an emotionally loaded subject?

The best source would seem to be one of your predecessors. But Georgia Chao, a Michigan State University industrial psychologist, warns that if the company finds out about the contact, "they may view it as going behind their backs" and consider you sneaky or unreliable. Also, the story you hear from a disgruntled former employee may well be anything but objective.

To get to the bottom of the mystery, you'll need to bide your time and take a more subtle approach. "You have to be a detective," says Meryl Reis Louis, associate professor of organizational behavior at Boston University.

Take subordinates out to lunch one at a time to get a sense of how they see your department, suggests Arthur A. Witkin, chief psychologist at Manhattan's Personnel Sciences Center, a career-counseling service. But don't expect the people who work for you to speak openly about office personalities or politics unless you take the first step. "What they need to know is, are you going to give a damn about them and your joint tasks," Witkin explains. Once you've established that you care about their concerns as well as your own, he predicts, "they'll probably spill the beans on your predecessor."

Query your peers about office procedures and policies, counsels Chao. But beware: The middle manager next door might mislead you, if he or she is competing with you for the next promotion. So verify whatever you hear, perhaps by seeking out industry scuttlebutt from former colleagues and at trade shows.

If you choose your supervisor as a source, state out front that you want to avoid your forerunners' mistakes. Your goal is to learn about the formal responsibilities and unwritten codes of behavior. Use this meeting to define your boss's expectations and work style. "A good boss will appreciate this," says Chao.

Once you've gathered all the particulars, you may discover that the job is as difficult and insecure as you feared. If that is the case, advises Harry Levinson, a clinical professor of psychology in the Department of Psychiatry at Harvard Medical School, "Ask yourself, 'Can I do this task under these circumstances?' If the answer is no, you may have to cut your losses and start looking for a new job."

> *Only detective work will tell you why some jobs are revolving doors.*

Alternatively, it may be a situation you can fix, such as company policies that inadvertently work against you. For example, you've been hired to meld a group of salespeople into a cooperative team, but they still receive bonuses for individual performance. Louis suggests presenting this kind of organizational inconsistency to your boss. "Your supervisor may surprise you and share your assessment," she says.

Finally, Chao believes compatibility between you and the company culture is critical. Is the office formal or informal? Are you a team player or a lone wolf? Perhaps none of your predecessors was able to identify or adapt to the prevailing corporate style. If you can, "You may prove to be the hidden ingredient to make the job work," says Witkin.

What Makes Teamwork Work?

To respond quickly to market changes and opportunities, companies today must develop new products and put them into production faster than ever. But how can managers and workers be induced to work more creatively and efficiently?

General Foods has found new inspiration in an old idea: teamwork. About five years ago the company launched a line of ready-to-eat desserts by setting up a team of nine people with the freedom to operate like entrepreneurs starting their own business. The team even had to oversee construction of a factory with the technology required to manufacture their product.

Historically, it's taken companies five to seven years to go from concept to shipping. But this high-performance team had Jell-O Pudding Snacks desserts in grocery stores nationwide within three years — fast enough to establish a dominant market position. General Foods' ready-to-eat desserts sales now exceed $100 million.

Since that rousing start, the team concept is expanding throughout the company. Once used primarily in the planning sessions of division managers and in development, teams now are used even on the factory floor, where employee productivity teams work to lower costs and improve working conditions.

Marc Bassin, former director of management and organization development at General Foods Worldwide, believes the teams create higher motivation and commitment, more innovation and better performance. "Teams can withstand much more stress than individuals because teams reproduce a family structure," Bassin says. "That sense of belonging — coupled with the additional energy team members provide for each other — results in more excitement and enthusiasm."

Not everyone is quite so optimistic about performance teams. Robert Lefton, president of Psychological Associates, Inc., in St. Louis, has studied 26 senior executive teams, 20 of them in companies on the Fortune 500 list. He found that less than 10% of the interaction among team members could be called true teamwork. At "lower levels," he believes, teams fare even worse.

What sabotages teamwork? Lefton believes it's ineffective leadership, and he pinpoints two basic management styles that suppress rather than encourage teamwork: 1. "hierarchical" or "formalistic" teams, in which the team members "spend a lot of time ratifying the leader's demands without the opportunity to critique . . . . Get-togethers are formalistic, superficial and perfunctory;" and 2. "circular" teams, in which "harmony and equality are the prime values" and collegiality is mistaken for the hard give-and-take of collaboration.

True performance teams, by contrast, "are recognizable by the easy frankness that marks team discussions," Lefton says. "Members argue and disagree without embarrassment, and the commitment is evident in the spirited seriousness with which the team goes about its work. The team leader, while enlisting the entire team in setting strategy, problem solving and decision making, remains very much in charge."

Bassin agrees with Lefton that real teamwork doesn't come naturally to most people. High-performance teams may take three to five years to build, he says, so they are most useful in cases where people need to be interdependent.

Bassin identifies five ingredients essential to a high-performance team.

1. A clear goal to power the team and define its course. "If the goal is to get a new product on the market first," he says, "the team can decide what trade-offs to make." For example, "instead of spending time and energy on testing the product's market-appeal, the team may just push ahead on the intuition that it's hot."

2. Roles that advance the goal rather than fit traditional job descriptions. What counts is who can do the job best. "Usually, marketing people market, and finance people do finance," says Bassin. "But on a team like the ready-to-eat dessert group, the marketing person, rather than farm research out to the marketing department, can turn to fellow team members."

3. Flexibility of goals as well as roles — a willingness to shift goals as new information comes in.

4. Rewards that reinforce the team process. Offering the team salary increases to get a product to market by deadline encourages collaboration.

5. An assertive leader who focuses the team's efforts.

Bassin admits that intracompany power struggles often arise as team members start taking on responsibilities that are usually handled by more senior managers. But that, Bassin argues, is exactly how companies can get leaner and more competitive. "Teams may be the wave of the future," he predicts. "In an era of mergers and takeovers, teams are a way of recapturing loyalty. Individuals also get hooked by the bonuses, autonomy and excitement, and organizations become more flexible so they can respond quickly to market pressures and opportunities. Teams create a win-win situation."

—PAMELA KING

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SHAKING THE BLUE-COLLAR BLUES

Unskilled workers took a beating in the Eighties. Happily, more people are enrolling in post-secondary schools. And corporations are learning that training pays off.

■ *by Jaclyn Fierman*

USED TO BE if you were free, white, and 21, you just about had a lock on the American dream. The job at the local plant or department store was waiting for you after high school. Before long you saved enough to get married and buy your own home. Things got better year after year, and the world you passed on to your children was better than the one your father handed you.

The Eighties put an end to that. In an unprecedented setback, a whole segment of American society headed downhill: people who didn't go to college. Among the hardest hit were the nearly nine million white men 5 to 34 years old who had either dropped out of high school or quit the books right after graduation. Over the past decade and a half the living standards of this ten-year cohort eroded by 1% to 2% annually—the same amount they used to gain, says Harvard labor economist Richard Freeman.

The crowded elevator also carried down blacks of all educational levels, *even* college graduates. Women, by contrast, generally improved their lot over the Eighties (see chart). A high school diploma alone was enough to push them ahead of their counterparts ten years earlier. Though women still earn only 65% of what men earn, Harvard economist Claudia Goldin estimates that the male wage premium shrank by 18.5%.

At the beginning of the Eighties the guys who had gone to work after the senior prom took home 26% less than their classmates who had gone to college. By 1989 the gap had more than doubled to 55%. The small number lucky enough to land good, low-skilled jobs and hold them saw their real wages creep upward over the decade. But when they stopped to compare themselves with their parents at the same age or, more pointedly, with their better-educated peers, their sense of well-being quickly dissolved.

Impossible, you say. During one of the greatest economic expansions the world has ever seen, people actually fell from grace? Even worse. People are always moving up and down the ladder. But this time, says Greg Duncan, a program director at the University of Michigan's Survey Research Center, "a *higher* percentage of people headed in the wrong direction than in decades past." The preliminary results of Duncan's latest study show that 7.8% of adults between 25 and 50 who had middle or high incomes in the early 1980s had fallen to the lowest-income group by mid-decade. Over the comparable period a decade earlier, only 5.3% of the haves became have-nots.

continued

Laid off in 1982 and again last fall, Gale Prime, 34, is studying toolmaking to secure a better future.

PHOTOGRAPH BY JIM LUKOSKI—BLACK STAR

Happily, the Nineties can—and should—be different. Demographics and global competition, which weighed against so many workers in the past decade, are combining to create a new premium for people with training. "You need front-line workers to be thinking workers, not just cogs in the machine who perform the same simple task 800 times a day," says Ira Magaziner, a management consultant in Providence. Magaziner is a proselytizer for better training and a principal author of *America's Choice: High Skills or Low Wages!*

Farsighted companies such as Corning and Motorola are already investing in company-wide training to upgrade skills, with clear rewards for both employers and employees. Post-secondary enrollments are rising, especially at two-year colleges. But business, government, and academia still have more to do before a shipshape American work force can ensure rising productivity and living standards.

HOW DID an entire generation of Americans get left behind? Ask Gale Prime, 34, a General Motors assembly line worker who by 1982 had worked his annual wages up to $30,000, enough to secure passage into America's middle class. His one-bedroom home in Saginaw, Michigan, was comfortable enough for his wife and young son, and his horizons extended as far as the combined horsepower in his driveway (a 16-foot motorboat, a dirt bike, a snowmobile, a Buick Electra, and a Ford Bronco) would carry him.

Prime bid the good times farewell when he was 26. Laid off in 1982, he sold his possessions and enlisted in the Army. He drifted after his discharge in 1986 until GM rehired him a year later to work on an assembly line in Tarrytown, New York. Determined to provide for his family and keep history from repeating itself, Prime began an apprenticeship in toolmaking at GM. But he lost his job again last fall, three years shy of regaining some semblance of job security. "I always thought I'd work at GM for the rest of my life and go fishing on the weekends," he says, arms slumped over the top of a lathe at Westchester Community College, where he is fulfilling the classroom component of his training, courtesy of GM.

> **"I always thought I'd work at General Motors for the rest of my life and go fishing on the weekends."**

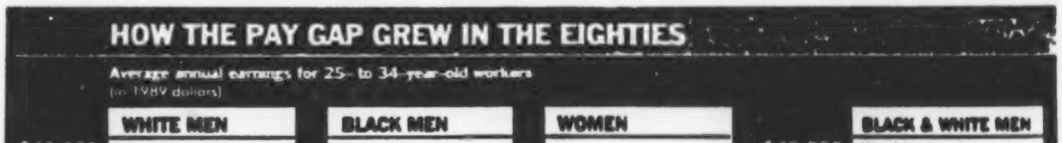
Demographics threw the Primes of the world in with the fish. During the 1970s a crush of college-educated baby-boomers hit the job market. Columbia University economist David Bloom estimates that among white men 25 to 34 with full-time jobs, there were nine college graduates for every ten who had completed no more than high school in 1979. The Ph.D. driving a cab was more than a metaphor—he was a fact the country over, as the better-educated vied with the less skilled for entry-level jobs. Eventually the market began to send a message: Why bother with college?

People got the message, but their timing was dreadful. By 1988 there were only seven baccalaureates for every ten who held no more than high school diplomas. At the same time, the unskilled jobs were drying up. According to the Work in America Institute, a labor force research organization in Scarsdale, New York, corporate America cut some 4.5 million jobs over the decade it automated and outsourced.

Companies facing new competition and more demanding customers suddenly wanted workers with better skills. Telephone operators had to know how to search databases; bank tellers, how to solve personal finance problems; and janitors, how to best maintain a shop floor. "You can't go to a textile factory today with a degree in football and know how to run the new machines," says economist Anthony Carnevale of the American Society for Training and Development.

Fathers who once proudly bequeathed jobs to their sons are empty-handed today. GM, Michigan's main employer since World War I, says its typical blue-collar employee is 44 and has 21 years of seniority. New hiring, except in engineering, design, or computer services, is rare. Says Columbia anthropologist Katherine Newman, author of *Fall From Grace: The Experience of Downw Mobility in the American Middle Class*: "Pe ple can pass on a desire to grab a share of the American dream, but they can't pass on their job or their status to their children."

Ask the Trevino family about generational givebacks. Alphonse, 48, son of a Texas migrant worker, waltzed through GM's gate in Flint, Michigan, 22 years ago. "People found two assembly-line jobs and then picked the better one," he says. Things were different when Trevino's son began pound-



College was worth the price for most Americans during the Eighties. Men who quit after high school found an inhospitable job market and saw their wages sink compared with those of their college-educated peers. Except for high school dropouts, women gained ground over the decade.

l Trevino Jr. can't find an assembly job that would keep him even with his father, a 22-year autoworker.

ing the pavement over a decade later. Since high school Alphonse Jr., 28, has moved from one low-paying job to the next and has just about lost hope of finding an assembly job. Says his father: "In Buick City there's nobody left with less than 13 or 14 years' seniority. We're the last of the Mohicans. We're on our way back to being migrants."

WHEN FOLKS like Trevino migrated in the Eighties, they often moved not to the farm but to the service sector, with its generally lower pay. Even many who stayed in manufacturing lost ground when they were squeezed out of lucrative union jobs, such as those in autos and steel. Columbia's Bloom says that in 1980, 47% of high school graduates over 25 and 40% of dropouts held union jobs. By 1988 only 31% of graduates and 25% of dropouts were paying dues. As membership dwindled, union settlements no longer pulled up wages at non-union shops. "The ethos that drove employers to treat workers more or less equally has weakened," says Brookings Institution labor economist Gary urtless. With competitive pressures growing, companies drove wages down.

Losing the union thread markedly changed Matthew Bowman's life. Raised in a Houston ghetto, Bowman made $18 an hour as a longshoreman in 1983. That also turned out to be his worst year. He was laid off and has yet to recover. He now makes $10 an hour as a jail guard for the Houston Police Department. Like many of those evicted from middle-class status in the Eighties, Bowman is pinning his hopes on his four children. Two years ago he moved to a modest home in Spring, Texas, a suburb of Houston known for fine schools. "At least I can send my kids in the right direction," he says.

REPORTER ASSOCIATE *Nora E. Field*

If the Seventies sent out a negative signal about the benefits of education, the Eighties hit people over the head with a different cue: Get a degree or else. Interest in four-year colleges is picking up steam. The U.S. Department of Education counts some 200,000 more college students than there were last year, pushing enrollment to over 8.5 million students. The Hudson Institute research organization in Indianapolis estimates that more than half the 18 million jobs expected to materialize by the end of the century will require advanced skills—not a baccalaureate necessarily, but at least some technical training after high school.

Nowhere is the momentum as great as at the nation's 1,200 community colleges, havens for people in their mid- to late 20s who are eager to acquire marketable skills. And with tuition averaging only $842 a year—half the price of a four-year state school and *one-tenth* the cost of a private institution—the education is a steal. The American Association of Community and Junior Colleges estimates that six million people will enroll in two-year colleges this year, up from 4.7 million in 1985.

While baccalaureates are best, post-secondary training of any sort secures jobs and fattens paychecks. A long-term research project by the Rand Corp. of Santa Monica, California, found that recipients of on-the-job training earn 16.9% more on average than the untrained. People who seek outside vocational training earn 11.9% more when they return to work, and community college yields an 8.2% premium. The study also found that people armed with vocational training are less vulnerable to layoffs for a good 12 years.

The returns from post-secondary training would no doubt be greater if course offerings more closely mirrored job market opportunities. Detroit, for example, has a huge presence on campus—witness the amount of heavy-metal offerings in the typical junior college course catalogue. Two-year schools are strongest in the areas of manufacturing technologies and health care. But they fall short in preparing people for many critical occupations, including food processing, warehousing, and front-line service in banks.

Getting kids to *go* to college in the first place is an even greater challenge than revamping the curricula. Though the number is edging up, just 60% of the high school class of 1989 signed up for post-secondary training of any kind. And if history is any guide, only half the college-bound will earn a baccalaureate.

Educators will be stumped by black youngsters, in particular, who ask, "What for?" During the Eighties blacks with college degrees earned half again as much as those who graduated from high school. But though

The Eighties hit people on the head with a new message about the benefits of education: Get a degree or else.

the premium held up, they were losing ground. They earned nearly 11% *less* in real terms than their counterparts a decade earlier. Hiring cutbacks by the federal government, which had traditionally absorbed a large number of college-educated blacks, hit this group especially hard, says Harvard's Freeman. Another reason blacks lost ground, he suggests, was the weakening of affirmative-action programs during the Reagan years: "Business had the feeling that it wasn't worth spending a lot of resources on the issue because Washington didn't care."

Whatever their race or gender, all youngsters heading directly for the workplace after high school could use help making the transition. Boons for unskilled youth are the budding partnerships between businesses and high schools that enable students to apprentice while continuing their education. "Watching and imitating is how children make their way into adulthood," says Assistant U.S. Secretary of Education Christopher Cross. "Apprenticing youngsters to masters is founded on this fact of life."

EMPLOYERS who capture the minds of future workers at an early age stand to gain a lot. Take New York City hospitals, which are in dire need of support staff. The Greater New York Hospital Association is working with the board of education to train secondary school students to become orderlies, aides, technicians, and practical nurses. In September, 100 middle-school children will begin basic courses that by 12th grade will equip them to don a white coat right after graduation.

Jail attendant Matthew Bowman and wife Tina feel college will make the difference for their kids.

In Cambridge, Massachusetts, Polaroid Corp. recently joined forces with the Cambridge Rindge and Latin School, which has one of the oldest vocational programs in the country, to better equip youngsters for entry-level jobs. Polaroid pays eight seniors $7.79 an hour to learn on the job. The 20-hour workweeks include instruction in carpentry, air-conditioning repair, and the photographic process. Says participant Brian O'Connor, 17, of the opportunity: "This may help me get a job at Polaroid so I can earn money to go to college." So far the program is mainly generating good will. In the long run, it might provide a new source of trained workers.

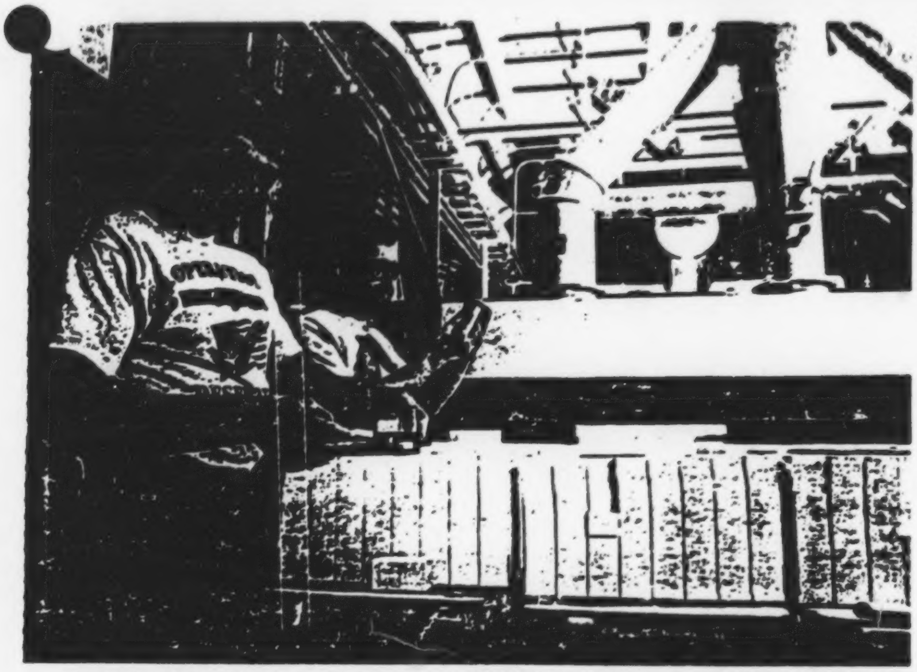
Polaroid is a snapshot of experimental projects the federal government ought to be encouraging around the country. Currently the Labor Department spends about $3 million a year in seed money for such apprenticeships. Senator Sam Nunn has proposed legislation that would up the ante to $50 million a year.

State and local governments play a bigger role. According to a report by the Congressional Office of Technology Assessment, 44 states spend about $375 million on training tailored to the needs of local businesses. Local governments spend at least that much. Companies pick up most of the training tab and should, but Washington could nudge them with a small tax break—similar, say, to the incentive they used to get for investing in new equipment. The nation can fairly expect the same returns from education that individuals and businesses receive.

Corporations that take training seriously can show eye-popping benefits. Consider grade-A trainer Motorola. The electronics company spends about $60 million a year on 104,000 employees worldwide. During the Eighties much of the money went to remedial education so that the company's largely illiterate production work force could master seventh-grade reading and math. Today workers who used to perform one or two repetitive tasks are learning to handle a dozen different jobs, work faster, and make fewer mistakes.

The payoff? Motorola says it has saved no less than $1.5 billion over the past three years, largely because of improvements the training has made in its work force. In some operations, Motorola gets $33 out of every dollar it spends on training, says William Wiggenhorn, corporate vice president for training and president of Motorola University.

Yes, university. Motorola U. exchanges faculty, jointly develops courses, and shares



These Corning employees, packing filters in Erwin, New York, must master every aspect of production.

lab equipment with local community colleges across the country. Eleven years ago Motorola concluded that it would not survive over the long run without a better-educated work force. Back then the company anticipated a one-shot training investment of $35 million over five years. Now it expects to invest $120 million *annually*—$60 million in training and another $60 million in lost work time—for the indefinite future.

CORNING is a convert. "We're in a mad race for competitive position," explains David Luther, senior vice president of quality. The company expects every employee, from forklift operator to division manager, to spend 5% of his working hours learning new skills. "This goes way beyond the old watch-Joe method of teaching," says Luther. "Joe might have been doing the job all wrong." To get things right, the company has formally assigned 400 people to train others in their departments.

On the glass company's cutting edge is Corning's cellular ceramics plant in Erwin, New York. The 70 employees, most of whom never went to college, work in teams to produce filters that purify molten metal. Everyone on the four production teams knows how to operate and repair the machines, load the kilns, pack and ship the filters, order parts, and control for quality—tasks that used to be divvied up one per person.

The more you learn, the more you earn at Corning's ceramics plant. The varied production tasks every team member performs are broken down into four levels of difficulty. Progressing through each level brings a raise—up to $2.25 an hour for those who reach the top. Fail to complete the second level after two years and you're fired.

Talking with the ceramic associates, as Corning calls them, makes it plain that morale has improved along with wages. So has quality. Plant manager Corbin Plymale says the reorganization has saved "tens of thousands of dollars," twice as much as the investment in training. In five years Corning has cut the cost of each filter by 60%. Even more noteworthy: Corning had to toss out 9,500 of every million filters in 1986; last year there were only five rejects per million.

U.S. corporations spend at least $30 billion a year to train employees. It's nowhere near enough.

Business can also sponsor off-site training, particularly at junior colleges and vocational schools. Each of the Big Three automakers has a retraining fund for laid-off workers that many have drawn on to pay college tuition. GM started its pool, known as the nickel fund, in 1982: 5 cents per employee per hour. Recently the fund has swelled to as much as $120 million a year and includes money both for people out of work and for those still on the job.

Verna Samuel, 38, a divorced mother with four daughters, used to work at a Fisher auto-body plant in Flint. In 1987 former GM chairman Roger Smith shut down the plant, a decision later vilified in the film *Roger & Me*. She used GM retraining money to take a course in entrepreneurship. Today Samuel is a self-employed seamstress, with a pick-up and delivery service for working women. Her earnings come to about $7 an hour, just under half her GM pay. But she makes up most of the rest in a pension she continues to receive from the company.

Fortified with skills he bought with GM retraining money, Gale Prime, the idled assembly line worker in Tarrytown, New York, plans to approach his former boss again. Just a few months from completing his courses at Westchester Community College, he says, "I hope this training will make the difference when I apply for another apprenticeship back in Michigan."

Men like Prime will have their best shot at competitive companies that want to smarten up—not dumb down—their production processes. Also receptive are those that have discounted low wages as a currency to buy global market share. Today U.S. corporations spend at least $30 billion a year to train junior and senior employees in subjects from basic arithmetic to biofeedback techniques. Nowhere near enough, given the dramatic productivity improvements companies can win by embedding learning in the workplace. Only about 12% of the nation's work force receives any formal training at all on the job.

Fully three-quarters of the people who will be employed in the year 2000 are already at work—eager to remain and more willing than ever to do what it takes to stay there. They are especially amenable when the American dream hangs in the balance. That's good news for corporate America. Especially since the message from places like Corning is the same one that came back from the superbly capable non-college-educated troops in the Gulf: People *can* be trained. F

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MANAGING

THE REVOLT AGAINST 'WORKING SMARTER'

Participative management—quality circles, work teams, and the like—have shown impressive results. That's one reason many managers resist this revolution.

■ *by Bill Saporito*

IT WAS really beautiful. Honchos and supervisors, pencil pushers and clock punchers, all gathered around the corporate foundry to forge a new relationship based on the idea that workers could play an active part in management. Some termed it participative management, others, working smarter. Born of the often desperate struggle in the late Seventies to hold the fort against foreign competitors, the new way entailed asking employees how their work might be improved and then letting them improve it, often in work teams or so-called quality circles. The initial results were eye-opening. A study of 101 industrial companies found that the participatively managed among them outscored the others on 13 of 14 financial measures.

[illegible]

The concept seemed unstoppable. Ironically, though, its very success has caused some people in corporations to view it as a threat. "The problem with participative management," says Raymond E. Miles, dean of the University of California's business school at Berkeley, "is that it works."

At many, if not most, companies that have tried it, participative management remains a gewgaw bolted on to the management machinery by social engineers. It fails often, a victim of backsliding, backbiting, backhanded treatment, and back to business as usual. "A lot of it was something that was not going to last, couldn't last," says Michael Maccoby, director of Harvard's Program on Technology, Public Policy, and Human Development

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After failing once, [illegible]

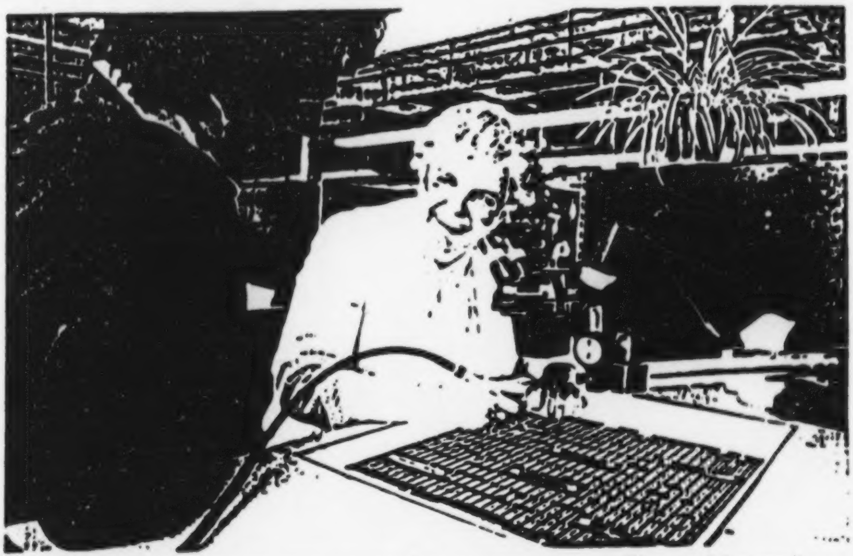
The consensus among academics, consultants, and managers is that most efforts to introduce participation never make it. William Cooke, a professor at the University of Michigan who is researching the subject, concludes: "About 75% of all programs in the early 1980s failed."

The reason? Consensus here too: not the workers but management—upper, middle, and lower. The concept was consigned to the shop floor and, even if it flourished there, was never permitted to creep higher. Jump on the quality circle bandwagon? Sure. Takers were everywhere. But change the behavior of managers or the organizational structure? Not this decade, thanks. The price of failure to establish a boiler-room to boardroom network of committed participative managers: shattered circles, confusion among the survivors, and the same old miscommunication between the ranks.

For as long as participative management has been around—there were experiments as far back as the 1920s—middle managers and foremen have been reluctant to sign on. Of late their recalcitrance seems to have been compounded by the newfound need at many companies to reduce the work force. Kicking tail and taking names is a lot easier when jobs are at a premium. Give a guy the mandate to downsize and watch him cut waste. Notes John R. Werdehoff, director of industrial relations at Eaton Corp., the Cleveland auto-parts-electronics outfit: "It is tempting for some of our managers to say: It's our turn. We've got the club."

Quality circles, those Hula Hoops of 1980s management, are wobbling. The number of circles tracked by the International Association of Quality Circles (IAQC) now exceeds 6,000, but growth proceeds by fits and starts, with plenty of failures along the way. "I spend about half my time doing repair jobs," says Jefferson F. Beardsley, one of 2,200 managers and consultants who recently crowded the Baltimore Convention Center at an IAQC meeting. The circles' proponents complain constantly that too many companies buy off-the-shelf programs merely because everybody else has them, and then blame the consultants who help install them when the programs fail. Without commitment from the top, goes the argument, even the best packages are doomed.

General Electric's experience over 20 years demonstrates how difficult it is to get management to consistently support participative programs. [illegible]



Honeywell found it easy *to get factory employees working smarter—Winnifred Arsenault (right) suggested the light table to inspect chips. Changing managers' thinking has been harder*

one plant. Everywhere else the programs fell victim to layoffs, management rotation, and what has been the company's benign autocracy—do it your way, but. "This is *hard* stuff, changing all those headsets," notes Gary Ross, a human resources manager in the company's lighting group. He blames GE's slow progress on what he calls "the accountability issue." Managers who think that their businesses are producing acceptable results aren't particularly interested in changing their ways.

BUT THE lighting group, which has shut down ten plants in the past three years, is feeling enough pain to get very interested. The managers don't have to look far for an example to emulate. The group's Newark, Ohio, plant—the lone survivor of GE's early effort—was designed and built for a participative approach back in 1973. There are only four job categories, compared with 21 at other GE lighting plants. Work teams perform many tasks once handled by supervisors. Anything they can see in their area is their responsibility, known as line-of-sight management. When the plant, which makes quartz tubes used in producing semiconductors, was whacked by the slowdown in the computer industry, the workers decided first to slow production and eventually to [illegible]

pation program that plant manager David Hanson says has increased productivity about 25%. The plant claims to be the world's most efficient producer of high-discharge lamps—the kind used in streetlights—measured by the ratio of raw material to finished product. "We're not mounting this effort because it's a nice thing to do," says Hanson. "Competitors all have money, technology, and competence. The key then becomes how well you can motivate the people."

The participative process doesn't always fit easily with traditional management methods and measurements—and "We do what we're measured by" is an old maxim at GE. Even with measurable improvements at the Ravenna plant, Hanson has battled to keep the *idea*, and not the numbers, in the forefront of everyone's attention. "We've had vice presidents ask for tangible measurements," says Hanson. "We've refused to do that. We refused to count dollar savings at any given point. We feel this is a long-term commitment."

But plant managers can't evade responsibility to "make the numbers" on the bottom line—the ones top management has always insisted on. And they feel other pressures. Tom Fussner, the young plant manager in Newark, says that in addition to the usual expectations from above, the workers expect more from him. Under the [illegible]

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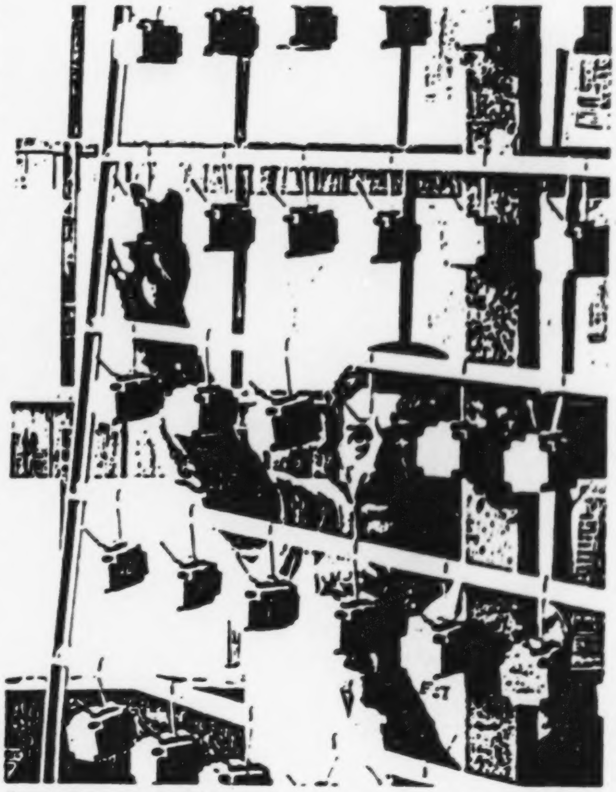
…y too hold the boss responsible for its performance. To add to the cultural problems, plant managers with this new kind of experience are sometimes seen by higher-ups as tainted, GE insiders say, and may have a tougher time getting promoted because they don't manage the old-fashioned way. Kissler believes the tables will turn, and soon. "People with this kind of experience," he says, "can't be bought."

For every triumph like those at Ravenna and Newark, GE has had a disaster like the Lynn, Massachusetts, defense plant. There the company tried to set up a quality circle program without union backing. The union quickly crushed the idea. A second effort, with union cooperation, ended about a year ago. Rick Casilli, a circle leader, says it became apparent that the company was clothing authoritative management in participative dress: "The group felt that management had the plans and was only bringing them to the worker improvement group to get them approved."



Employee suggestions *reduced defects in Eaton's switch housings tenfold. After initial gains, participative management has stalled.*

A bigger problem involved grievances. The company insisted that incidents on the shop floor, such as reprimands and suspensions, were not subjects for the circles to discuss. "People are not faucets, they can't be turned off emotionally," says Kevin Mahar, president of the union local. "Somebody on the shop floor gets disciplined and it creates emotion, and when that happens, the company expected the people to go into quality circle meetings and forget what happened." This year the union struck the plant for a month over grievance issues.

At many corporations the initial glow of participation brightened the productivity landscape with a sort of a giant Hawthorne effect. Turn up the lights, productivity increases; turn down the lights, productivity increases—anything that suggests management cares. But the movement has done little to alter managerial behavior at most companies. "There's nothing wrong with a Hawthorne effect, but it has to be distinguished from culture change," says Macy. "It was first generation. The second generation is really forcing companies to change in terms of the way they look at management's function." And there's the hitch.

The higher up the corporate ladder, the tougher seems the shift to the participative mode. Says the chief executive of an aerospace company, "It's no fun if *you* can't make the right decisions." Eastern Air Line's desperate sale to Texas Air reflected not only a failure to reach agreement on wage concessions, but also a failure of union boss Charles Bryan and Eastern Chief Executive Frank Borman to bury the hatchet other than in each other. "There's no question, neither Bryan nor Borman could make the shift to a fully participatory style," says John Simmons, president of Participation Associates, a consulting firm that studied the company.

THIS despite successful efforts to introduce participative management elsewhere in the company. Even as Bryan and Borman fought, self-supervised ramp crews were unloading bags, restocking planes, and managing far more efficiently than before. Machinists came up with $50 million of productivity increases in the first six months after participation was introduced. But Borman and the union leadership failed to get to the real problem, says Simmons: The day-to-day working relationship at the top between management and union. At meetings where cooperation should have been paramount, bickering, finger-pointing, and other carry-overs from the past clipped Eastern's wings.

The failure or refusal by many organizations to make the necessary cultural conversion is hung up on the old issues of authority. "We know how to do it on the factory floor," says David Dotlich, a vice president of human resources at Honeywell, where workers leaped at the opportunity to become more involved. "Management still assumes its role is to tell—and not tell." Information is power, and access to it remains a clear badge of rank to managers. Even though many companies are forcing managers to put out information on the number of units produced, costs, and other sensitive issues, the idea still doesn't sit right.

Fearing a loss of power, many middle managers torpedoed early participative programs, and the experience has tended to confirm them in their opposition. The case of Boeing Aerospace's manufacturing division, with 300 managers spread through four organizational levels, has been fairly typical. The division's initial thrust at participation in 1980 was to put together trouble-shooting teams of workers, engineers, and managers to smooth bumps in production. Other middle managers often perceived the teams as intruders, and the idea flopped. "The only thing that remained was a negative attitude about employee involvement," notes Carl Hicks, head of quality improvement in the division. "We're still trying to undo that damage."

Employees who remembered the first try were less than enthusiastic about the second, initiated in 1984. Middle managers failed to support the effort, designed to establish quality circles, because they were left out of it. "They perceived the program as a parallel structure, and some thought they were supposed to butt out," says Hicks. Only when the middle managers were invited into the program did it begin to take off, resulting in 40 circles and, according to Hicks, a 400% return on the money invested in setting it up.

The skills required for the would-be participative manager—communicating, motivating, championing ideas—are sandy intrusions in the gearbox of many traditional executives. Before General Motors converted its Buick City plant to the new way, the company undertook a campaign replete with videotapes, coffee mugs, hats, and other cheerleading to tell everyone just how good participative management was going to be. "There's nothing the company didn't do," says William Byham, president of Development Dimensions International, the firm hired to train the managers in participative skills. When asked before their training if they believed the type of management they were about to learn would actually be used, more than half the top managers, two-thirds of the middle managers, and four-fifths of the line supervisors said no. "At the start of the program two-thirds of the top management couldn't run a participative style meeting if they had to," says Byham. He says that the training markedly improved attitudes and participative skills.

Commanded to put in place what they perceive to be management du jour, the best of the managerial lot often go off on their own tangents. "We have unit managers who say, 'If you want me to get the stuff out in quantity and with the right quality, I'll do that, but let me do it my way,' " says James V. Gale, director of employee participation for Deere & Co., the big farm machinery maker. Other bosses insist they already are participative managers. Now in the fourth year of a publicly proclaimed transition to a more participative style, Deere is not forcing the change, although it directs all unit managers to share more information with employees. About half its plants have a formal program to make the transformation.

MORE DIRECTION may be required to ensure the transition. Eaton, a company with a foot in both traditional manufacturing and high tech, was one of the first large companies to alter its organization on the factory level. In the late 1960s the company began to open "new philosophy" plants that eliminated time clocks, put all employees on salary, and allowed workers to decide for themselves their hours and vacations. In the 1970s the company began adding work teams and quality circles. Two years ago the company took a reading and discovered that the relationship between management and labor had indeed improved, perhaps so m[illegible] so that managers didn't feel the need t[illegible] any more participative. "We plateaued," says Wendenhof, Eaton's industrial relations chief. "The plants did not continue the evolution. It didn't go to the next level that I would have pictured: self-managed work groups, or processes that brought decision-making down to lower levels."

Eaton ran into a curious irony of participative management: It can't be installed participatively. The program needs leadership ready to cram it down the organization. Eaton has formally made participation a corporate goal and has taken steps to hasten its progress. To signal the change, E. Mandell De Windt, Eaton's chairman until he retired in April, led one of the first meetings to introduce the policy. Wendenhof says: "We're not leaving it up to unit managers today. We've said, 'This is the philosophy.' " The company has put its top 150 executives through three days of training in participative techniques. If all goes according to plan, those executives, mostly unit managers, will sow the seeds of change among the people reporting to them. Wendenhof sees the corporation advancing "beyond the conceptual" by next year.

Top managers at other companies ref-

Participation gurus *such as Ralph Barra (standing) are trying to teach managers the new methods. Having worked with hourly employees, he says the movement must reach the top. At this workshop with RCA execu. participants honk a horn when they think someone isn't cooperating.*

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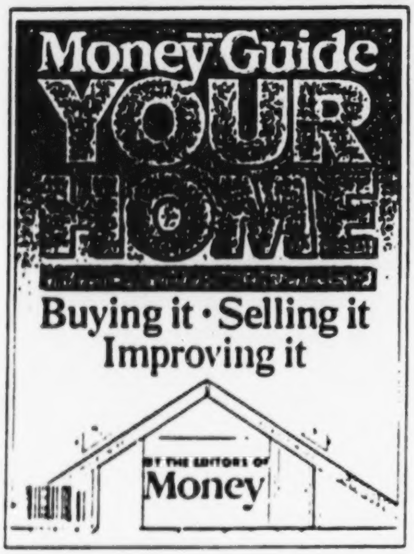
earn, though, even when the evidence is right there before their faces. GE's successful Newark plant was modeled on a Gaines Foods plant. The participative system at Gaines began when the company was part of General Foods—it is now owned by Anderson Clayton, and Quaker Oats wants to buy it. Under its different owners, the plant has been a long-running success. But the owners didn't do much with the idea.

The Gaines plant, built in Topeka, Kansas, in 1969, did away with traditional supervision through the use of work teams. In addition to running machinery, work teams hired new employees and were responsible for quality control and maintenance. "We have succeeded in spades," says Herman Simon, the plant manager. The plant's biggest battle was fighting off corporate attempts to impose traditional management controls. General Foods, in the meantime, built only one other plant along the same lines, in Canada. It closed last year because the market didn't meet expectations. "We have a number of people who wanted to move the participative process throughout the organization as quickly as possible," says Anthony Olkewicz, an organizational development expert at General Foods. "When that was posed as a strategy and short-term goal, a lot of people said, 'Wait a minute, why do I have to fix what is going quite well?' "

CONSULTANTS such as Ralph Barra, who spent 30 years on the human resources front for Westinghouse, believe that this if-it-ain't-broke-don't-fix-it notion may be holding back U.S. management. "We're great at maintenance management," he observes, "and in making small improvements. But why should the status quo be acceptable? Why not 40% improvement instead of 10%?"

There is, to be sure, a certain righteousness to the participatory bunch, a belief that theirs is the true religion—the First Participation Pentecostal Church and Productivity Revival mission—and the rest are just sinners who must repent or meet their Maker. But what if these zealots are right? "It's Japanese managers and workers against our managers," says Barra. "The companies that will survive are going to be participative." Plenty of managing sinners seem willing to risk the apocalypse. Confronted with this persistence in error, the participation gang has another strategy. "We're just going to have to wait until some people leave or retire," says one believer. And so they wait, prophets in their own country. ◘

THE
Money Guide
TO
BUYING, SELLING AND
IMPROVING YOUR HOME



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MAY 17, 1993

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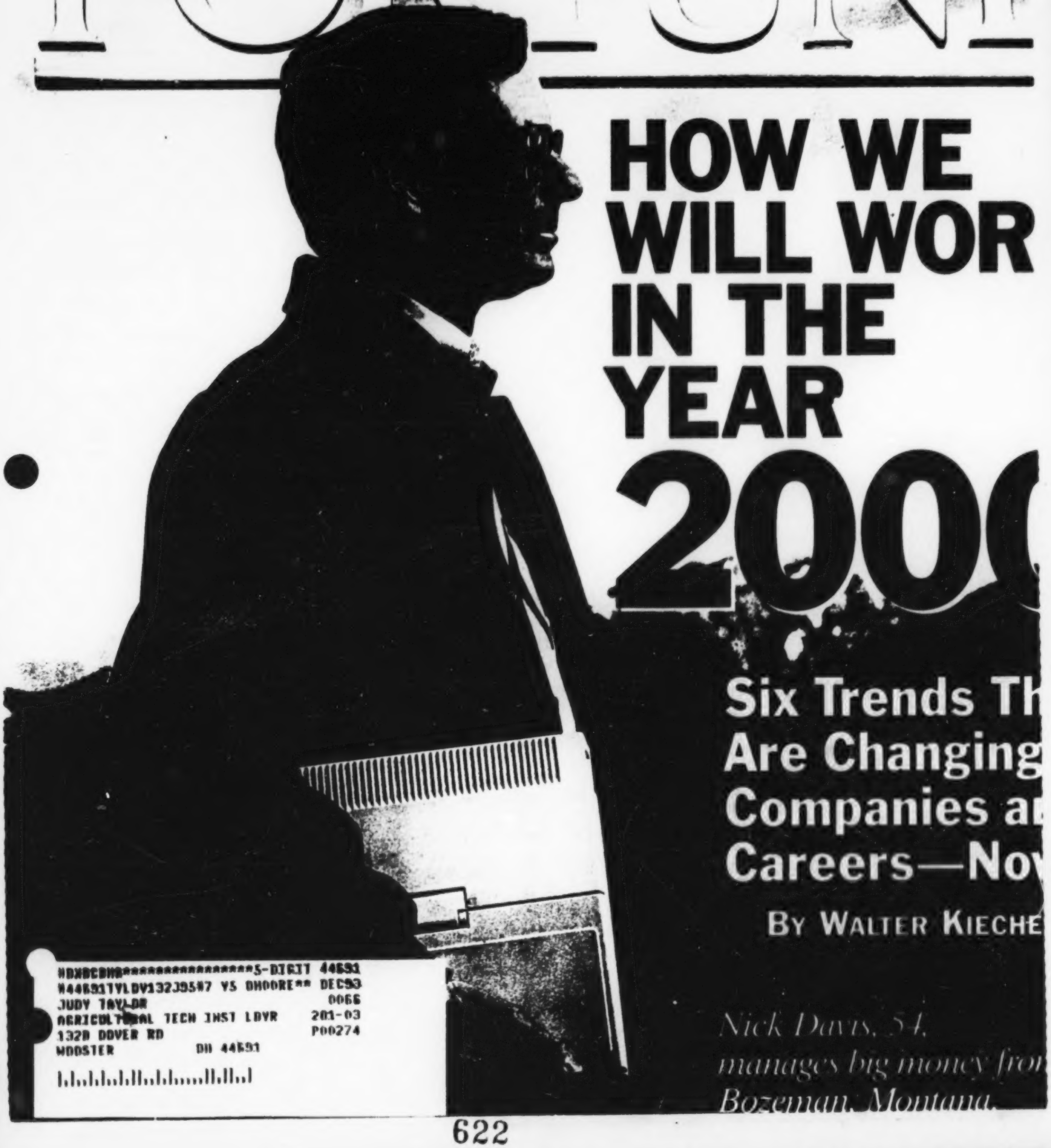

HOW WE WILL WOR IN THE YEAR 200

Six Trends Th Are Changing Companies a Careers—No

BY WALTER KIECHE

Nick Davis, 54, manages big money fro Bozeman, Montana.

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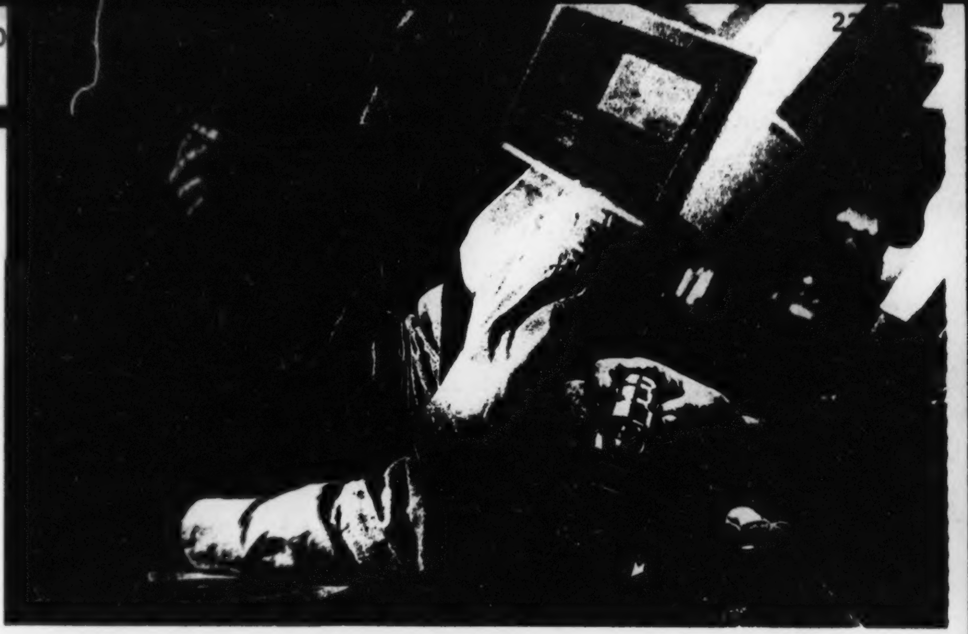

THE YEAR 2000 will dawn on a Saturday, perfect for nursing recollections of the Nineties and soberly contemplating the era ahead. Ruminative types among the approximately 133 million people then in the work force will look back on a decade of change all the more head-spinning for its seemingly chaotic, devolutionary quality.

The average size of a U.S. company, measured by the number of individuals it employs, will have decreased. More people will have set up in business for themselves. Many of the industrial colossi, long the pillars of our economy, will have broken up or hollowed out. Taking the place of the hierarchically layered giants will be not just one type of organization but a variety of them, with names such as spider's web.

What Americans do on the job will have changed too, so much so as to cry out for a new definition of work. The old blue-collar elite will have ceded pride of place to an ascendant class, technical workers, who program computers or conduct laboratory tests or fix copiers. Almost everyone, up through the highest ranks of professionals, will feel increased pressure to specialize, or at least to package himself or herself as a ketable portfolio of skills. Executives and what used to be called managers will have undergone probably the most radical rethinking of their role.

And more and more of the population will be caught up in the defining activity of the age: scrambling. Scrambling for footing on a shifting corporate landscape—cynics will call it a freelance economy—where market forces have supplanted older, more comfortable employment arrangements. Scrambling to upgrade their software, their learning, their financial reserves. Scrambling even to carve out moments of tranquillity under a banner blazoned FIGHT STRESS, a banner flapping like a Tibetan prayer flag in the gales of change.

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:y Hunter, a junior ntist with Rohm & ;, worked his way rom a janitorial job tudying agricultural ıgy. Like others in ıew elite, he'll need eep learning. Here :hecks a lima bean t· other drapes ...er in a second ısure.

Stephen R. Barley, a professor at Cornell's School of Industrial and Labor Relations, builds on the work of others to argue that until recently, "the economies of the advanced industrial nations revolved around electrical power, the electric motor, the internal combustion engine, and the telephone." The development of these "infrastructural technologies" made possible the shift from an agricultural to a manufacturing economy, in the process precipitating "urbanization, the growth of corporations, the rise of professional management, the demise of religion, and the disintegration of the extended family."

Now, Barley writes, the evidence suggests that another shift is taking place, with implications likely to be just as seismic: "Our growing knowledge of how to convert electronic and mechanical impulses into digitally encoded information (and vice versa) and how to transmit such information across vast distances is gradually enabling industry to replace its electromechanical infrastructure with a computational infrastructure."

You already know part of the punch line from this not unfamiliar tale: The computational infrastructure, computers at its heart, takes over progressively more of the work that can be routinized—and ever more can, with the new technology—from guiding machines that make things to transmitting information within the organization or across its boundaries. Bingo, you've got flexible manufacturing, program trading, and point-of-purchase terminals wired into the supplier's factory.

Experts on such transformation, people like futurist Tom Mandel at SRI International in Menlo Park, California, correct our impression that new technology drives changes in how we work; rather, it enables them. Posit increased competition through the Eighties, the maturity of existing infrastructural technologies, even a falling rate of profit overall for the postwar U.S. economy. The result of such pressures, argues Mandel, is that "people in business are rethinking, reinventing, reengineering, what-

SIX TRENDS THAT WILL RESHAPE THE WORKPLACE

■ The average company will become smaller, employing fewer people.

■ The traditional hierarchical organization will give way to a variety of organizational forms, the network of specialists foremost among these.

■ Technicians, ranging from computer repairmen to radiation therapists, will replace manufacturing operatives as the worker elite.

■ The vertical division of labor will be replaced by a horizontal division.

■ The paradigm of doing business will shift from making a product to providing a service.

■ Work itself will be redefined: constant learning, more high-order thinking, less nine-to-five.

SMALLER COMPANIES

With a half-million dollars' worth of high-tech equipment but only ten employees, Brian Westcott's Westt Inc. in Menlo Park, California, does sophisticated custom manufacturing and industrial automation. Clients can check product specifications via the company's computer network.

PHOTOGRAPHS BY BOB SACHA

BUSINESS E
SUNDAY, FEBRUARY 28, 1993

Ringing in the new

Ameritech calls up a new way of running a business

By JAY GREENE
PLAIN DEALER REPORTER

CLEVELAND

Even at 7:30 in the morning, after a brutal overnight snowstorm, Jacqueline F. Woods was preaching the new Ohio Bell Telephone Co. gospel.

Woods, who became Ohio Bell president Jan. 1, was munching on bacon and eggs with 20 workers, answering their questions about the "new" Ameritech Corp., Ohio Bell's Chicago parent.

For nearly two hours, Woods fielded questions on how the company planned to implement new technology and how the company's new structure, which will eventually eliminate the Ohio Bell name, would change things.

Then, Robert Barron, a manager in the residence service unit, asked Woods how she planned to change the corporate culture — buzzwords for getting workers more involved in helping Ameritech compete in the volatile telecommunications marketplace.

"There are 20 of you here," Woods recalled telling the group. "All of you have to chip in."

As bland as that sounds, that sentiment embodies the new corporate culture at Ameritech. The company announced Monday a new corporate strategy and structure under which it plans to drop the geographic boundries that defined the company, doing away, for example, with the Ohio Bell name.

But more than geographic boundaries, Ameritech is dropping a whole way of thinking.

A company that has never asked its workers to do more than show up and put in an honest day's work is now asking them to play a role in guiding the company into uncharted waters. Ameritech has joined legions of other American businesses in converting to the corporate religion known as total quality management.

But the shift is perhaps more significant at Ameritech. For workers there, it means a complete about-face. Ameritech, steeped in the utilities-industry malaise that guaranteed profits virutally regardless of performance, is working to figure out how to become competitive.

And if there ever was proof that total quality management was going to be a mainstay in Corporate America, this might be it. If a staid utility embraces this change, there can be little doubt that the rest of corporate America will not go back.

In her two months as Ohio Bell president, Woods has been making the rounds, meeting with 2,500 workers, scheduling breakfast sessions every other week and trying to pitch the new Ameritech. She said workers, after months of voluntary buyouts and layoffs, are ready to hear how they fit into the evolving company.

"I think they are anxious to trust," Woods said. "Now we've got to see if the company can walk the talk."

That talk, generally behind closed doors for the last year, was finally outlined last week. On Monday, Ameritech unveiled its new corporate mission to take it into an era of telecommunications in which it would compete for local and long-distance phone service as well as cable televison customers.

The plan, a result of a year-long corporate brainstorming effort dubbed "Breakthrough Leadership," will reconfigure Ameritech along its business lines. Pay phone or residential service units, for example, will handle customers in all five states. All of the units will be marketed under the Ameritech name.

"We've worked very hard to streamline the operation," Woods said.

Streamline is a word few would associate with local telephone companies. Profits are assured, and competition is virtually nonexistent.

But in a handful of markets — particularly Chicago and New York, and, to a lesser extent, Cleveland — a few upstart companies are wiring pieces of town with fiber-optic cable to lure business customers away from the Bells.

Those so-called bypass companies generally offer competitive rates to connect a businesses' long-distance calls directly to a long-distance carrier.

Beyond that, Ameritech is looking to a not-too-distant future when cable TV companies, already reaching 60% of U.S. households, use their capability to offer phone service.

Ameritech doesn't have to look much further to see the day when cellular phone companies pull customers away with the expanded capability of wireless communications.

"They see those guys coming down the road," said Richard A. Kuehn, a Cleveland telecommunications consultant. "And the competiton is working a lot slimmer and a lot meaner."

Even though Ameritech is an $11 billion company, it faces an uncertain future with nearly flat earnings and revenue growth. That's because its core business, local phone service, is heavily regulated.

To meet the competitive challenges it sees on its horizon, Ameritech wants to knock down regulatory barriers that bar it from offering long-distance and cable-television service.

The problems Ameritech faces are in many ways similar to those of American Telephone & Telegraph Co. after the 1984 court-ordered break-up. AT&T, raised in a monopolistic world, was forced to compete on nearly every front, from its long-distance business to computer and equipment sales. It was losing much of the time.

The one significant difference is that Ameritech was wise enough to see competition looming and to take action before problems mounted.

SEE RING/5-E

Ring

FROM/1-E

"The thing going for the Ameritechs of the world is that they are doing it when they don't have any operations that are gushing money out of them," Kuehn said.

But for all the hoopla over new strategic directions, little will change if the company cannot convince its employees to come along for the ride. So while the changes generally look good on paper, making them reality is the true challenge.

Whether Ameritech is up to it is a question. In the world in which it existed for the past eight decades, the company never pushed its employees as much as it promises to over the next few years.

"Divestiture was a big change for everyone," said Barron, the 19-year phone company veteran who attended Woods' breakfast session. "But the direction Ameritech is going is probably the biggest change I've seen in my career. We're all asked to do more."

Ameritech's first task must be changing workers' mind-set, said William Golomski, a professor of quality management at the University of Chicago's Graduate School of Business.

"You have to change the expectations," he said.

Ameritech went a long way toward doing that with the announcement of its grand plan Monday. The company now needs to keep pounding away with meetings, newsletters and even casual chitchat that keep the message out there. And to deal with the shift to competition, Ameritech needs to bring executives from other competitive businesses in to teach the company what it takes.

"Many people are so insulated on how competition affects business, they are oblivious," Golomski said.

Ameritech has already started to change. Through the end of March, the company is holding "Visions and Values" meetings, mandatory sessions for managers to get them to buy into the new corporate mission.

The company is also pushing another favorite phrase of corporate-speak: "employee empowerment." In a handful of offices, employees are setting up self-directed work groups, essentially employee-run units that have little supervision from superiors.

Perhaps the most difficult change has been efforts to open communications between executives and midlevel managers and between managers and the rank and file.

"We weren't getting from employees what we needed to meet customers' needs," said Woods, 45, a 23-year phone company veteran who rose through marketing and sales units.

"I don't want to represent that we solved that problem," she said, "but we've cracked the dike."

The company still has a way to go.

Just before Ameritech made its big announcement, rumors, as constant at Ohio Bell as a dial tone, were making the rounds again. This time, the buzz was that the company was about take out the ax again, chopping at staff.

Woods was working the phones right up to the announcement, talking with union leaders in an attempt to allay those fears.

"I was sad that we had an announcement that implied to some we were going to have layoffs," Woods said.

If Woods has anything going for her, it may be that the workers who didn't take the buyouts — which cut 4,600 management jobs at Ameritech — may be the ones most likely to buy into the new corporate culture.

"They are the people who seem willing to change," Woods said.

Barron, the worker who asked Woods about corporate culture, said her outlook is the sort the company needs. "I don't think you'll find a person within Ameritech that doesn't think we need to make some changes," Barron said.

NAME: JACQUELINE F. WOODS
TITLE: President and chief executive officer, Ohio Bell Telephone Co.
BIRTHDAY: Oct. 22, 1947
FAMILY: Husband, John; children, Nicole, 15, and Stephanie, 13.
EDUCATION: Muskingum College, Bachelor of Arts degree in psychology and speech.
EXPERIENCE:
1970-1978 — Ohio Bell's public relations and public affairs departments.
1978-1982 — Bell of Pennsylvania's public relations and public affairs departments.
1982-1986 — Sales and marketing positions at Ohio Bell Communications, Ohio Bell's sales subsidiary.
1986-1989 — President and chief executive of Ohio Bell Communications.
1989-1990 — Vice president of finance and administration at Ameritech Services Inc., Ameritech Corp.'s marketing, planning and purchasing unit.
1990-1992 — Assistant vice president and general manager of business markets at Ameritech Services.
1993 — President and chief executive of Ohio Bell.
Source: Ohio Bell Telephone Co.

MANAGING

THE NEW NON-MANAGER MANAGERS

Call them sponsors, facilitators—anything but the M word. They're helping their companies and advancing their careers by turning old management practices upside down. ■ *by Brian Dumaine*

IT'S STILL OPEN season on the American middle manager, and big guns continue to bag their daily limit without difficulty. Hardly a day passes without some formerly blue-chip outfit like GM, IBM, or Sears dispatching another couple of thousand or so to the corporate afterlife. The American Management Association reports that while middle managers are only about 5% of the work force at the 836 companies it surveyed, they account for a plump 22% of the past year's layoffs.

The reasons are no mystery. Middle managers have always handled two main jobs: supervising people, and gathering, processing, and transmitting information. But in growing numbers of companies, self-managed teams are taking over such standard supervisory duties as scheduling work, maintaining quality, even administering pay and vacations. Meanwhile, the ever-expanding power and dwindling cost of computers have transformed information handling from a difficult, time-consuming job to a far easier and quicker one. Zap! In an instant, historically speaking, the middle manager's traditional functions have vaporized.

That's bad enough. At the same time, competition is forcing many companies to squeeze costs without mercy. Guess who looks like a big, fat target? Says Cynthia Kellams, a management consultant at Towers Perrin: "If you can't say why you actually make your company a better place, you're out."

Knowing precisely what middle managers won't be doing much of anymore is only so useful. What *will* they, or their late Nineties equivalents, be doing? For an answer, look at those who are p[illegible]pering. Call them the new managers, or—better yet—the new, non-manager managers. Many, perhaps most, are baby-boomers who bring a radically new set of values to the workplace. The 78 million Americans born between 1946 and 1964 tend to be an irreverent bunch. Many don't see the CEO as much of a hero. In fact, they often think the big guy gets in the way. They like to call themselves leaders, facilitators, sponsors—anything but managers.

More significantly, boomer managers want something other than the reassuring routine of the organization man. They want challenging and meaningful work. Says Lou Lenzi, a general manager at

"I raise hell where I have to raise hell and cajole where I have to cajole."

LOUIS LENZI, 35
GENERAL MANAGER
RCA TELEVISION

RCA who helped create ProScan, a successful new line of televisions: "For me there is a certain amount of professional pride, the satisfaction of making something happen."

For a closer glimpse of tomorrow's manager, consider Cindy Ransom, 37, a middle manager—er, sponsor—passionate about her job at Clorox. Three years ago Ransom asked her workers at a 100-person plant in Fairfield, California, to redesign the plant's operations. As she watched, intervening only to answer the occasional question, a team of hourly workers established training programs, set work rules for absenteeism, and reorganized the once traditional factory into five customer-focused business units. As the workers took over managerial work, Ransom used her increasing free time to attend to the needs of customers and suppliers.

Last year Clorox named Ransom's plant the most improved in the company's household products division, its largest. Did money spur her to help work the change? That certainly doesn't hurt, but she cites a more compelling reason: to see the people who work with her succeed. Says she: "When I read about America losing its competitive edge, it really pisses me off. It gets me motivated to make a difference in my little corner, to make my factory competitive enough so my people can be employed here until they retire." For her reward, Ransom won't move up in the hierarchy, but instead will get to apply her skills at a Clorox plant overseas, which suits her just fine.

Managers like Ransom, committed to coaching, sponsoring—heck, why not use the term—empowering their people, are still rare. Says James Champy, CEO of CSC Index, a consulting firm in Cambridge, Massachusetts, that specializes in reengineering organizations: "We won't see them in great numbers for another five to ten years. But corporate America is definitely going in that direction."

Another reason the new manager is coming into vogue: Middle managers who master skills such as team building and intrapreneurship and who acquire broad functional expertise will likely be in the best position to get tomorrow's top corporate jobs. That's because the role of the top executive is becoming more like that of a team player and broker of others' efforts, not that of an autocrat.

Look at Drypers, a small but fast-growing maker of disposable diapers. This profitable Houston company, whose sales last fiscal year grew 24% to $140 million, operates with an office of the chief executive that consists of five managing directors, all with equal power. The five, each of whom has a functional responsibility like finance, marketing, and manufacturing, work much like a middle management team, sharing information and kicking around ideas. No major decision is made until the five managing directors arrive at consensus. A lone CEO might be able to make a decision faster, but at Drypers, once a decision is made, all functions feel they own it, which helps wonderfully their inclination to put it into effect swiftly.

For example, the company last year developed and launched technologically advanced, disposable training pants called Big Boy and Big Girl in six months, fast by industry standards. After only a half year on the market, the new line has an impressive 20% market share in southeastern Texas. Says managing director David Pitassi: "When you have a shared vision, it's a very powerful thing."

"I'd like to manage my way out of my current job in two years."

DEE ZALNERAITIS, 37
GROUP MANAGER
R.R. DONNELLEY & SONS

In companies that have adopted advanced organizational structures and systems—flattened hierarchies, self-managed teams, cutting-edge pay and performance systems—a number of variants on the new manager are emerging.

THE SOCRATIC MANAGER

■ An old-school manager often told people what to do, how to do it, and when. A new-style manager asks the questions that will get people to solve problems and make decisions on their own. Dee Zalneraitis, 37, the information group manager at a Hudson, Massachusetts, division of R.R. Donnelley & Sons, America's largest printer, is a good example.

Her division began converting to self-managed teams last year. Zalneraitis's new role is to teach, train, cajole, and comfort her 40 people until they feel confident

REPORTER ASSOCIATE *Jacqueline Graves*

WHICH KIND ARE YOU?

OLD MANAGER	NEW MANAGER
■ **Thinks of self as a manager or boss**	■ **Thinks of self as a sponsor, team leader, or internal consultant**
■ **Follows the chain of command**	■ **Deals with anyone necessary to get the job done**
■ **Works within a set organizational structure**	■ **Changes organizational structures in response to market change**
■ **Makes most decisions alone**	■ **Invites others to join in decision-making**
■ **Hoards information**	■ **Shares information**
■ **Tries to master one major discipline, such as marketing or finance**	■ **Tries to master a broad array of managerial disciplines**
■ **Demands long hours**	■ **Demands results**

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"When I read about America losing its competitive edge, it pisses me off."

Cindy Ransom, 37
Factory Manager
Clorox

enough to do the things she now does—hiring, firing, scheduling vacations, and the like. Once Zalneraitis feels her people can handle the responsibility, she hopes to move on to another equally challenging post in the company, somewhat like an internal consultant might. Says she: "I'd like to manage my way out of my current job in two years."

One of the hardest things about being this kind of manager, Zalneraitis found, is letting people figure things out on their own when she knows the answer. But it's the only way people can really learn, she says. A worker once went on vacation without scheduling someone to cover for her. Although Zalneraitis saw the problem right away, she had to sit and listen to the phones ring until her people figured it out.

Another of Zalneraitis's goals is to bring as many of her people as possible into decision-making. This entails decisions. "You always have to ask yourself, should I invite them to participate in the process?" she says. Under the old system, Zalneraitis at budget time would spend a week and a half behind closed doors feeling harassed. Now she shows all her people the budget and asks them how they can save money. They respond: An employee helped her balance the budget by suggesting they do away with some scheduled trips to an unreasonably demanding customer, for instance. Says Zalneraitis: "It takes a lot more time explaining things. You really have to enjoy helping them learn." If she does her job [illegible] her hourly people will soon take over budgeting.

Even more than line managers, staff people must adopt new roles as teachers. Example: When he was head of human resources at S.C. Johnson Wax, the $3-billion-a-year maker of household products like Raid and Pledge, Earl VanderWielen redefined the job of the human resources manager. In a traditional system, an HR person is often divorced from day-to-day business, spending his time supervising companywide pay systems and making sure everyone adheres to government regulations. By contrast, VanderWielen knows the business inside out—he spent ten years as a manufacturing manager—and gets deeply involved in operations. When the company decided to move toward self-managed teams about eight years ago, VanderWielen and his small staff worked long hours on the factory floor, teaching line managers and workers about such management techniques as statistical analysis and pay-for-skills. In one instance, a team of workers figured out how to switch a line from liquid floor wax to a stain remover in 13 minutes instead of three days. Overall results have been startling. At its plant in Racine, Wisconsin, Johnson Wax has increased productivity 30% in the past eight years while reducing the number of middle managers from 140 to 37.

THE OPEN MANAGER

■ Self-managed teams like those at R.R. Donnelley and Johnson Wax work only when all members have the same information, and lots of it. That's something Kevin Grundy, a director of manufacturing and engineering at Next Computer, believes in deeply. While Next, which sells high-performance workstations mostly to the government and universities, has been struggling financially, it is still admired as one of America's most open and freewheeling companies. To be competitive, founder and CEO Steve Jobs believes, every employee must contain the company's DNA and therefore must be privy to crucial information like profits, sales, and strategic plans.

But Next takes openness a step further: Everyone knows everyone else's salary and stockholdings, or at least can find out just by asking. Says Grundy, who believes sharing pay information helps morale: "The availability of salaries ensures that most inequities in the the system get resolved. You don't want a lot of secret deals going on and one guy making more than the guy sitting next to him because he's a good negotiator."

At Grundy's factory, he and the human resources staffer have a list of what everyone makes. Anyone can come and look anytime. Grundy used to post the salaries but found that some people would look at the list and walk away in a lather. The idea now is to make sure the person with the list is trained to offer explanations about pay discrepancies. A very good engineer who was busting his back on a project saw that his compensation was lower than someone else's on the team. Grundy said to him: "I realize it's unfair but I just can't go and change it. Give me some time to get you where you need to be. You have to trust me." It worked. The engineer remained a productive member of the team, knowing that he'd eventually get his raise. In another instance one of Grundy's people asked, "Why don't I get paid more?" Grundy didn't think he deserved more. Says he: "You have to sit down with someone like that and talk about where he needs improvement. If he's only working eight hours a day and everyone else is putting in 12, you have to highlight the difference."

Interestingly, Grundy found that few people ask to see the list. He guesses they figure they can't do much about their pay anyway.

THE RENAISSANCE MANAGER

[illegible]member the heyday of the general manager 20 or 30 years ago? Many executives, consultants, and academics believed then that a good manager could manage anything—a sharp insurance executive could shape up a machine-tool company in no time. The new manager also has broad skills but sticks to his industry or core technology, such as microchips, pharmaceuticals, or financial services. His breadth of knowledge is in the different functions within his industry or technology: sales, marketing, manufacturing, finance.

You'll find one of these corporate Renaissance men in Indianapolis at the U.S. headquarters of France's Thomson Consumer Electronics, maker of RCA televisions. Louis Lenzi, head of industrial design in the television division, wears conservative clothes and a no-fuss haircut, but he's no Fifties organization man. When asked how he motivates people, Lenzi will point to a life-size poster in his office of the Punisher, a horrific Marvel comic character, and then pick up a toy machine gun a[illegible]tart spraying the room.

[illegible]ponding more seriously, Lenzi, 35, says the trick to working with people to get things done—especially when you have no direct authority over them—is to win their respect. He does this by showing them he has a thorough understanding of their jobs, skills, and needs.

Example: Over the past couple of years Lenzi has served on the cross-functional eam of managers—marketers, engineers, manufacturing experts—that developed ProScan, a successful high-end ine of TVs. Because each manager took turns being eam leader, no one was realy the boss. This meant Lenzi had to win his teammates' repect by demonstrating a broad knowledge of the business. In other words, he was not just some designer to be called on when deciding the [illegible]or shape of the new Pro[illegible]n TV; he was a real player. Lenzi's carefully planned background, which included assignments that taught him about marketing, manufacturing, and engineering, helped immeasurably. He spent nine months on the road, interviewing TV retailers and customers, sat in endless meetings with engineers and manufacturers working out technical details for the new set, and even helped work up the marketing campaign.

Not only is the line a success, but all the team members subsequently moved on to bigger and better things. Says Lenzi: "It made us all better generalists."

The hardest thing about being a new manager, says Lenzi, is that you're often handling two jobs at once. While working on the ProScan team, he also had to handle his day-to-day job managing 37 people designing other RCA products. Says he: "I had to build trust and confidence. Part of the trick is showing up only when crucially needed. If my people had an issue with the factory on, say, whether to paint the back of a TV—which the designers thought was a great idea and the manufacturers thought insane—I'd go to a meeting and raise hell where I had to raise hell and cajole where I had to cajole."

THE RADICAL MANAGER

■ Consultants say any new manager worth his or her low-sodium salt substitute must learn to create new businesses swiftly in response to fast and fickle markets. Anthony Lombardo, 45, general manager at Sony Medical, has found a formula for rapid-fire innovation. Sony Medical makes color printers and other peripherals for use with medical imaging equipment like ultrasound machines. A sort of entrepreneurial laboratory, the company has at least a half-dozen new seed ventures going at all times. Lombardo and his people spend lots of time with doctors and HMOs—their key customers—and constantly scan the rest of Sony for technologies that might serve those customers. Once they hit on one, they start a small cell of about ten people from different disciplines and let them run with it. The idea is to experiment constantly, move fast, see if the idea works, and if it doesn't, move on to the next.

An example: Using Sony's touchscreen and laser-disk-player technology, Lombardo last year worked with the Foundation for Informed Medical Decision Making to create an interactive system that helps patients in a hospital or doctor's office learn about their afflictions. Sales of the system should total $40 million within four to six years.

The key, says Lombardo, is constantly creating, juggling, shifting, and finally destroying organizations as the mar-

"To influence people, prove you're right and then keep hammering away."

JOHN RING, 55
DIRECTOR
OKIDATA

"The worst thing is to give someone an assignment he's bound to fail."

Rick Hess, 40
Director
M/A-Com

ket demands. Says he: "We're not bound by the shape of the car. We can change the shape of the car. We have people who go around the corporation and look for new technologies and ideas that will constantly drive change in our business."

THE SCAVENGER MANAGER

■ When times were flush in corporate America, a manager who wanted to create a new product would simply ask for resources—people, technology, money—and with luck, get them. Today, with budgets tight, the new manager must beg, borrow, and steal anything he can. A master scavenger is Okidata's John Ring, 55, who with no staff, little money, and very little authority, got six stubborn divisions spread over three continents to pool their resources on a project. The result: Doc-it, a new desktop printer, fax, scanner, and copier that an industry consulting group named product of the year last September.

A Brit with gray hair and mustache, Ring looks a bit weary as he recounts the Doc-it odyssey—understandably so. When he had the idea to combine all those features in early 1988, his compatriots at Okidata, an American subsidiary of Oki, a large Japanese maker of semiconductors, telecommunication equipment, and computer printers, said it couldn't be done.

Undaunted, Ring traveled to Japan and Europe to get the Oki people not only to buy into the idea but also to share their technological know-how. In Japan, for instance, Oki's fax and printer businesses were in different divisions.

Through sheer perseverance Ring eventually got the divisions to pool technologies and money. "To influence people you have to prove you're right, and then keep hammering away," he says. "I've been bloodied by this product, but I've given as good as I've got." When naysayers at headquarters in Japan said you couldn't get a printer in a box that small, Ring and a colleague went off to a garage in Cherry Hill, New Jersey, broke up an Oki printer, jammed the innards in nearly half the space, and glued the cut-up box back together. The printer worked.

Getting people to do things when you can't order them around, says Ring, is like living in some sort of Dadaesque world with no black or white and a thousand shades of gray: "You have to live with uncertainty. You never get the total green light. One day you wake up and say, 'I've done it.' It's all incremental."

THE HUMANE MANAGER

■ In a world of unceasing change, the new manager must balance the tremendous demands of work with demands from the rest of his life—and help others do the same. It isn't easy. No one knows that better than Rick Hess, 40, of M/A-Com, a Lowell, Massachusetts, defense company that makes microwave communications equipment and is trying to build business in the private sector. M/A-Com's chief operating officer said to the staff in April, "I went home last night and told my wife the next year will be hell. I sugge u go home and tell yours. It's tough times."

A typical day for Hess starts at 7 A.M. and ends at 7 P.M. He goes home, tucks his four young kids in, and then does paperwork until bed, typically about 11. He tries to leave weekends for his family. It helps, he found, to keep his work in perspective. "I'm a fairly patient person," he says. "I get angry but don't display it. I try to look at the long term. I always have a goal, and I focus on that and don't get upset with the day to day."

Hess knows his people are under a lot of stress, too, and that part of the new manager's job is to make sure they avoid burnout. He stays close to them, takes them to lunch, tries to find out what's going on in their lives. He plays softball and basketball with them one night a week. "I want know if someone's wife is h ing a baby so I don't give him a job that requires him to work an 80-hour week. The worst thing I can do is give someone an assignment he's bound to fail."

To motivate his people Hess constantly tries to get them to challenge themselves, another important skill of the new manager. "Don't rule people out because they don't have experience," he says. "Don't trap people in cubbies. Give people a reach if they have potential. Let a technical guy go and talk with customers and grow." Hess likes ambitious people because he understands that he won't be able to go to his next job until someone is ready to take his.

Being a new manager is hard. Practically no one has been trained for it, and many companies still aren't sure what to make of the phenomenon. If you want to feel noble about it, reflect that this new generation of smart, aggressive, entrepreneurial managers likely holds the key to America's future prosperity. And if nobility is a little higher than you're aiming, remember that in today's marketplace, with today's workers, the new non-manager manager has the best chance of producing the results that will advance his or her career. ■

EXERCISE 8-4: SELECTING A LEADER

To illustrate the problems in selecting a leader based on personal characteristics, read and follow the instructions in the following problem:

Suppose that once, as a result of a marine disaster, the following eight people found themselves in a lifeboat with 20 others, mainly children, a thousand miles from the nearest land and off the shipping lanes, with food and water sufficient in terms of normal consumption to sustain them for five days. There are two sets of oars, a small sail, and a compass.

Mr. Gold, age 40, a self-made man, the owner and director of a million-dollar company which has been built during the past 15 years. He is extremely tough and is well organized when forced to confront a problem.

Mrs. Gold, age 32, a social psychologist, who is also the president of the American League of Woman Voters. She is sometimes anxious in crisis situations but they seem to give her more energy.

Rev. Price, age 50, one of the country's most prominent religious leaders and pastor of one of the largest churches in New York City. His wife is missing in the disaster. He is low keyed and able to put people at ease.

A Soviet sea captain, age 59, who cannot speak English. His foot is badly hurt and he is in constant pain. He is extremely knowledgeable about the sea and is able to work with people.

Mr. Washington, age 29, promoter of various black activities on the West coast. Served as a medic in Vietnam. Is a very responsible person who shows a great deal of initiative.

Mr. Pope, age 60, a wizened little man without his teeth, a deckhand with 45 years at sea. He has an unusual ability to organize the components of a problem for obtaining a solution.

Mr. Smith, age 55, an official of the Teamster's union, battled his way up from the picket lines as an organizer. He is enthusiastic about the things he does and enjoys talking with people.

Miss Gordon, age 35, a prominent motion picture star. Enjoys sailing and good times but seldom allows her feelings for people to interfere with what she wants to do.

The sea is calm. The immediate emergency is over. The problem is now survival. Which of these eight people would be the best choice for a position of leadership, how would the person use this position, and why do you think his or her personal characteristics are important for acting as a leader?

Why did you select the person you did? Do you think that other people will agree with you? Check your selection and the reasons for it with typical responses my students make on page 269. Why do you think it is hard for everyone to agree on a single person? What does this say about predicting leadership based on the personal characteristics of people?

MONDAY

Business

Facts and fantasies about Total Quality Management

SMALL BUSINESS

Management

By Jerry White
Thomson News Service columnist

There is an entire industry of consultants, books, seminars and conferences arising to support the concept of Total Quality Management (TQM).

Does no one question the fact that if everyone is talking about implementing "quality" programs, there may be no competitive advantage for anyone?

In the automotive sector, North American and Japanese cars will be rated about equal in quality by consumers in 1993. The competitive advantage comes in innovation, added value, and most important, at the dealership level.

In addition, researchers have found the following items of concern regarding our current infatuation with quality:

1) Most consultants selling TQM will tell you it takes a long time to implement and the results will be small and gradual. In fact, real changes in quality should be prompt, by focusing on fixing the few serious items that need immediate attention, perhaps within as short a period of time as six weeks.

2) Companies consistently ignore the concept of benchmarking. Look to see who the recognized leader is in your business and set that leader's performance as your standard to achieve or exceed. Fewer than 19 percent of all North American companies do any research on quality issues and fewer than 10 percent do any form of competitive analysis to see what "the other guy" is offering to do.

3) Most companies fail to understand the linkage between entrepreneurship, innovation, service and quality.

4) Thirty-eight percent of owners said in a recent national survey that their TQM program has been a failure and only 36 percent said that it improved their company's competitiveness.

5) The study found that only 19 percent of all companies said customers play a permanent role in identifying new opportunities, and suppliers are almost never brought into the process.

6) Less than 30 percent of businesses said consumer complaints are of primary importance as a source of new quality ideas, compared with 80 percent of Japanese companies.

7) One way to insure that the quality program will fail is to let the accounting group have a central role in the quality planning process. Quality initiatives must be led be sales, marketing and research types.

Process simplification to remove red tape and paper work is considered by less than 20 percent of all companies, yet it has the highest correlation with customers' perception of improved quality for service businesses and retailers.

Worker training is most often seen as the fastest solution to overcome problems with quality. Training strategy is not long-term. It also fails to address basic skill requirements (such as being able to read instructions or do mathematical calculations) or job enrichment involving the learning of new skills.

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COVER STORY

Training Workers For Tomorrow

By Joan C. Szabo

PHOTO: T. MICHAEL KEZA

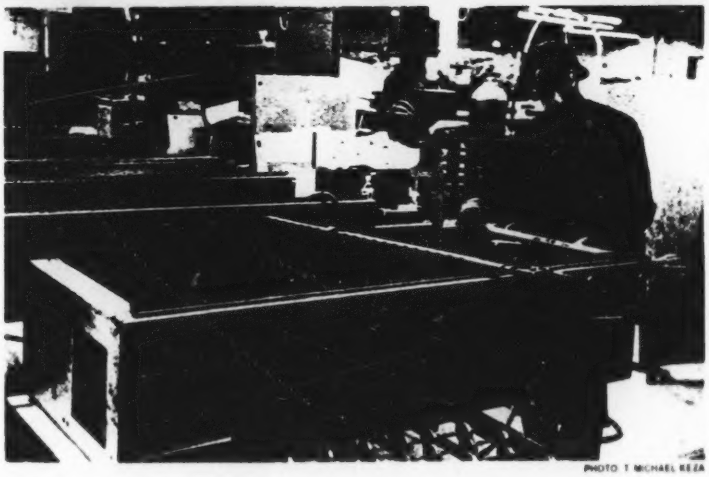


PHOTO: T. MICHAEL KEZA

Robotron employees *Loretta Parrish, above, and Rindy Williams, at right, were specially trained to ensure the quality of the company's heat-treatment products.*

Leonard Brzozowski, president of Robotron Corp., in Southfield, Mich., discovered in 1988 that 70 percent of the company's heat-treating products had to be reworked after customers put them in use. Among other problems, he found that some workers in a key operation were having difficulty reading blueprints and that overall workplace deficiencies were costing the company $1 million a year.

The 120-employee firm, with total annual sales of $18.5 million, produces heat-treatment machinery used mainly to make automotive-engine parts more resistant to wear. The machines are often custom-made, and the inability of some workers to grasp directions on assembling electronic components was undermining product quality.

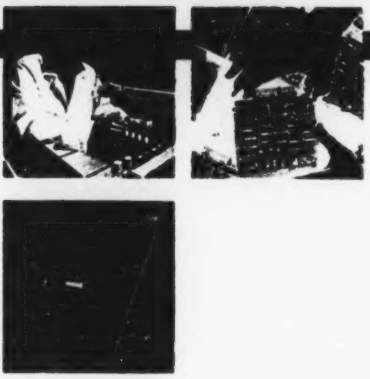
The $1 million cost of poor quality was attributed to such things as work having to be redone, parts having to be returned to outside suppliers, and finance charges assessed on some of the projects that were delayed because of reworking.

Brzozowski knew that for his company to survive in a highly competitive industry, he had to move quickly to upgrade his workers' skills. To deal with problems like the one in the electronics area, the company established a broad quality-management program that included targeted programs to improve reading and math skills.

Costs of the training for 1992 and 1993 are expected to total about $500,000, but Brzozowski believes such initiatives are vital in an increasingly high-tech era. "The skills of my workers have to be continually upgraded to keep pace with the technological changes that are occurring in today's workplace," he says. Brzozowski also notes that Robotron's investment is paying off: "We've reduced by about 70 percent the number of defects per unit reaching our final test department." In addition, the company has implemented 75 recommendations from employees aimed at saving money or changing an assembly process to further improve quality.

The paradox that Robotron faced—a decline in basic skills as jobs become more high-tech—confronts companies of all types and sizes throughout the country. Employers increasingly find they need workers with analytical skills, independent judgment, and the ability to work

Business, labor, and government must work together to plug the skills gap and keep America competitive.



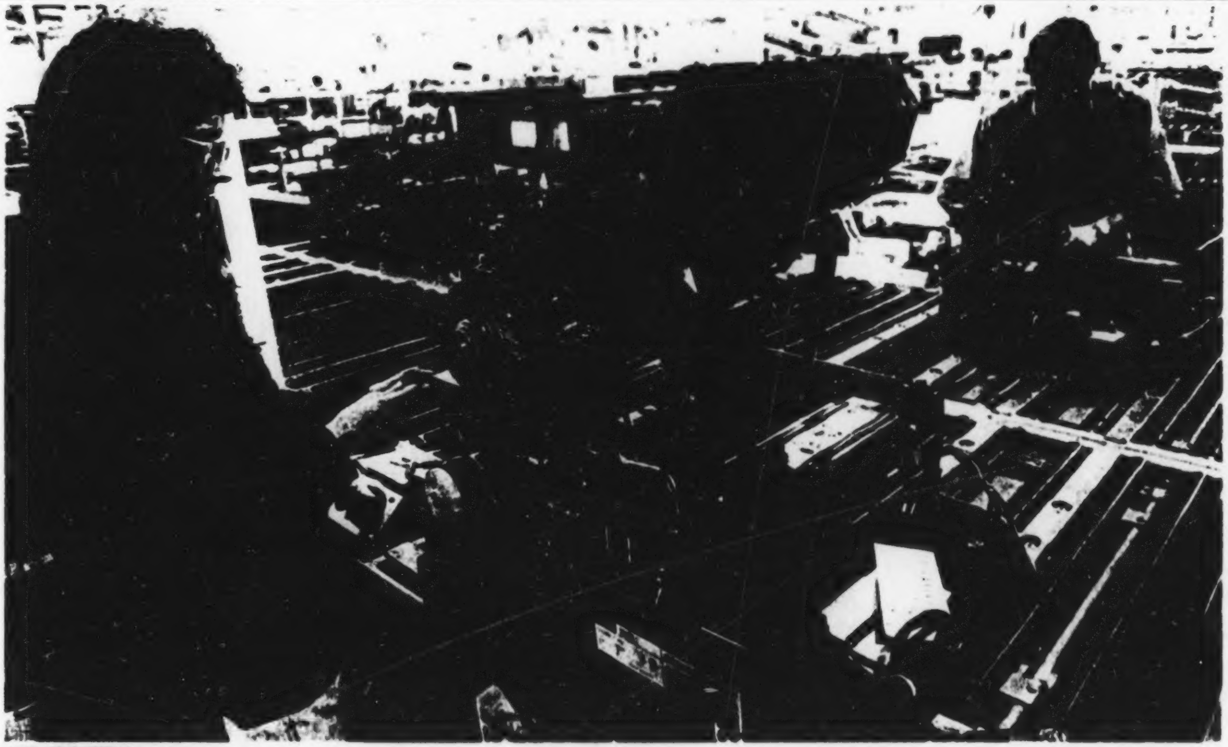


PHOTO: GREG HOFFMAN

In Xerox's Rochester, N.Y., "focus factory," *employees Michelle Lehman and Frank Trinoa use flexibility in building copiers.*

PHOTOS ABOVE, LEFT TO RIGHT: SOHM/[illegible] HOROWITZ/PETER STEINER—THE STOCK MARKET

closely with others in complex operations.

An example can be seen in manufacturing, where the practice of having workers perform simple, repetitive, assembly-line tasks is giving way to the concept of teams with interchangeable skills and broad operational responsibilities. These teams need members proficient not only in math and reading abilities but also in the application of computers to manufacturing and service operations. In the construction industry, for instance, workers now use new-generation, power-driven machines, lasers, and robots, which require levels of training far ahead of those needed less than a generation ago.

What is happening in construction reflects the widening gap between job requirements generally and the skill levels of many job seekers. This chasm is impeding growth for companies and the economy as a whole, says Jeffrey Joseph, executive vice president of the Center for Workforce Preparation and Quality Education, an affiliate of the U.S. Chamber of Commerce.

Projections of job needs through this decade alone spotlight the trend. The American Society for Training and Development, an Alexandria, Va., association of employer-based training professionals, forecasts that by 2000:

- ■ More than 65 percent of all jobs will require some education beyond high school;
- ■ Twenty-three million people will be employed in professional and technical jobs—the largest single occupational category—that require ongoing training.

In addition, the association says, almost 50 million workers need additional training just to perform their current jobs effectively.

In a related trend, the distinction between management and labor is narrowing, intensifying the need for greater knowledge and skill across a broader cross section of the work force.

As knowledge of the gap between skills and jobs becomes more widely understood, an emerging consensus holds that business, labor, and government must work together to eliminate it.

Plugging the skills gap has been a

PHOTO: PAUL FETTERS

William Curtin: *Sensitivity to workers is key.*

prominent theme of the Clinton administration, which sees achievement of this goal as essential to keep U.S. companies competitive with leading firms overseas and necessary to keep and create good jobs in this country.

President Clinton sees a highly skilled work force as a major incentive to encourage domestic and foreign firms to open facilities in this country. The administration believes that a top-notch work force, with its potential for increased productivity, will offset any perceived advantage for U.S. companies to go abroad in search of cheaper labor. But raising the knowledge and skill levels of the U.S. work force will take a concerted effort by all concerned, Clinton says.

Robert Reich, the new secretary of labor, who is expected to spearhead the administration's efforts to revitalize the American work force, emphasized just how important the work-force issue is to the administration during his confirmation hearings before the Senate Labor and Human Resources Committee: "The American work force is coming to be the American economy. That is the way you begin to define the American economy—in terms of skills and capacities of the people who are here."

A lawyer and former public-policy lecturer at Harvard University's Kennedy School of Government, Reich says a policy that will benefit all Americans is for the federal government to invest in the two assets that won't leave the country. One is "human capital," such as education and job training, and the other is physical infrastructure.

Reich sees education and worker training as key to raising U.S. productivity, economic growth, and living standards. "Unskilled and untrained Americans are losing out. If not competing with low-wage workers abroad, they increasingly are competing with new technologies here at home, which are rapidly replacing routine work of all kinds." Job training can help rescue those who are losing out, he says.

In addition to the new administration's emphasis on worker training, the focus on American jobs of the future has been underscored by the North American Free Trade Agreement, which Congress will consider for approval this year. According to a recent study by the International Trade Commission, an independent federal agency, the pact is expected to result in a short-term loss of U.S. jobs but a long-term gain in employment.

Clinton expects to push for a side agreement for retraining workers who lose their jobs because of the trade agreement.

PHOTO: ©TERRY ASHE

Robert Georgine: *Training should be negotiated.*

There is also widespread recognition that post-Cold War reductions in defense spending will mean that many defense workers will have to be retrained. Others who will need training include the hard-core unemployed and the millions who are employed but must continually improve their skills.

As these factors converge and awareness of the skills gap increases, some elements of society are increasing their efforts to address the problem. The U.S. Chamber of Commerce, for example, is moving on three fronts with programs to improve the education system, improve worker-training programs, and help companies adopt quality-management techniques.

In 1990, the business federation sensed the need for concerted action to generate education reform at the local level and established the Center for Workforce Preparation and Quality Education as an affiliate. The center moved immediately to equip local business leaders with the tools to spark education reform.

Among the center's recent accomplishments is a groundbreaking study that analyzed how education dollars are spent by the nation's schools. Financed through a grant from the Indianapolis-based Lilly Endowment Inc., the study devised a school-finance model that enables communities to track every dollar within their school systems, not just in the central office but also in every classroom.

The study's model allows communities to determine inequalities in spending within individual school districts.

The U.S. Chamber also has been on the cutting edge of efforts to promote lifelong learning and retraining. Last year the organization established its Quality Learning Services Division to provide television satellite seminars on quality management.

With state and local chambers of commerce as the link between the Washington-based learning program and individual business people, the seminars deal with topics ranging from global-trade opportunities for small firms to coping with such federal regulations as those for the new Americans with Disabilities Act.

The nation's largest business federation is also developing a plan that would equip U.S. educational institutions, local and state chambers of commerce, and other community sites with the technological tools and multimedia video and computer software to help improve education and training.

Known as the Community Learning and Information Network (CLIN), the

Continued on Page 28

A Web Of Federal Training Programs

President Clinton has said he wants to cut through the maze of federal employment and training programs to see whether the dollars supporting those programs could be used more effectively. A glance at the existing system shows why.

There are 125 such federal programs administered by 14 federal departments or independent agencies. Total federal funding last year exceeded $16 billion. The bulk of the programs—and the majority of the funding—are administered by the Department of Education and the Department of Labor.

Many of these job-training initiatives target specific groups such as youth or adults with mental or physical disabilities; 65 of the programs are geared toward the economically disadvantaged. Programs range from adult education for American Indians to health-career opportunities, senior community service, literacy training, refugee assistance, basic skills, summer help for disadvantaged youth, and training for single parents and criminal offenders. Typical services offered include counseling and skills assessment, occupational training, and job placement.

Program Overlap

But there is considerable overlap in the programs, the General Accounting Office (GAO) concluded in a report issued last July. Many programs actually provide similar services to the same target populations, the GAO found.

For example, 40 programs provide counseling and assessment to the economically disadvantaged, and 34 programs provide the same group with remedial or basic-skills training. The Labor Department administers a program for migrant and seasonally employed farm workers, while the Education Department has a program for disabled migratory and seasonal workers. There are six major programs in different agencies designed for Native Americans; there are four programs for migrant workers, four for the homeless, and at least 10 for veterans, including one specifically for homeless veterans. These same groups are also eligible for other programs.

PHOTO: T. MICHAEL KEZA

Manufacturing techniques *are the focus for instructor Lee Dye, center, Adrian Harmon, left, and Jimmy Biggs Jr. in a Winston, Ga., program operated under the federal Job Training and Partnership Act.*

Several factors make it difficult to coordinate and integrate these programs, says the GAO, including varying target-group definitions, differing administrative rules (planning cycles, accountability, and data-collection requirements), and competition among programs.

Coordination is further hampered by the fact that funding channels resemble, in GAO's words, "a sieve rather than a funnel." Control of funds lies at several levels. In some cases, funds go directly from the federal government to local agencies; in others, funds go to the state.

For some programs, the amount of money allocated is calculated by means of a formula. Often set forth by Congress, formulas may be based on population, per-capita income levels, or other factors relevant to a particular program. Other programs require states, local agencies, or local service providers to submit proposals for federal dollars.

Sometimes the population to be served is taken into consideration; sometimes it is not. And actual delivery of services is provided by several different entities, again varying by program.

The largest federal training program and one of the four programs that received more than $1 billion each in funding in 1991 was created by the Job Training and Partnership Act (JTPA), implemented in 1983. Administered by the Education Department, the program offers insight into the federal training infrastructure.

Governors have primary responsibility for overseeing JTPA programs, which are designed and operated at the local level and based on local labor market needs and opportunities. JTPA is formula-based; the states with the highest unemployment and largest population in poverty get the most money. State job-training councils coordinate training activities and make recommendations about training and funding needs to governors.

Still, according to the GAO, many federal training programs suffer from inadequate federal and state oversight, inefficient service delivery, improper program expenditures, and even questionable effectiveness.

At his nomination hearings before the U.S. Senate Labor and Human Resources Committee in January, Labor Secretary Robert B. Reich said, "There has to be some way to integrate these programs to make sure that we create a kind of one-stop shopping, regardless of why the workers are displaced." Reich also suggested that the new administration may place more emphasis on training "noncollege graduates" and on technical training. This change in orientation might help counter criticism that the federal training system is focused more on fringe groups than on raising the skill levels generally of the mainstream of American workers.

The Bureaucracy

The real challenge to changing the system is the "tremendous entrenched bureaucracy in the training area," says Brad Schiller, an economics professor at American University who has designed systems to evaluate training programs. "The problem is that a lot of people are paid to develop and design these programs." In addition, he says, there is no evidence that any of these programs have had a net effect on keeping people employed. A better answer to streamlining existing programs, he says, is to downsize or jettison them or perhaps return to their original purpose, that is, to act as a referral service between employers and job seekers.

—Roberta Maynard

Resources

General Accounting Office: For a free complete listing of federal training and education programs, call (202) 512-6000. Refer to document number GAO/HRD-92-39R, Multiple Employment Programs.

U.S. Department of Education: For details of the department's 49 employment-related programs, call (202) 401-1576.

U.S. Department of Labor: Office of Employment and Training Programs, Room N-4469, 200 Constitution Ave., N.W., Washington, D.C. 20210; (202) 523-6050.

U.S. Small Business Administration: For information on the SBA's training and employment programs, call 1-800-827-5722.

State and local training, employment, or rehabilitation offices. Look in the blue pages of your telephone directory under Employment Services.

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nationwide plan is intended to deliver a myriad of services to individuals of all ages. These include interactive and self-directed learning software; access to on-line information and databases; facilities for audio and video conferences; distance-learning capabilities, which permit interactive instructional or training services to be transmitted from a central site; interactive video disks; and electronic mail.

Distance learning represents a major resource in educating and retraining the American work force. And new computing technology can play an important part. If this technology is merged into community-based facilities, members of the network would avoid the costs of building, staffing, and maintaining new facilities. Resources could be shared by schools and others in the community, such as federal, state, and local governments; the National Guard and the Reserves; and private industry. All these entities are engaged in lifelong learning and training and would pay for the time spent using the system.

"The network could become an ideal mechanism for helping small businesses train their workers for 21st-century jobs in an affordable manner," says Joseph. This is an idea that has received congressional support, and the federal government will soon be funding pilot projects of the concept around the country.

Richard L. Lesher, the U.S. Chamber's president, says the Chamber believes "lifelong learning and training is essential if U.S. industry is to remain world-class, and the Chamber's recent actions are a reflection of that belief."

The Chamber has also made overtures to members of the administration and organized labor, expressing interest in a joint effort to upgrade the work force.

> Untrained Americans are losing out. If not competing with low-wage workers abroad, they increasingly are competing with new technologies here at home.
>
> Labor Secretary Robert Reich

Like the smaller Robotron Corp., larger U.S. corporations have recognized the need to establish cutting-edge training programs. Among the leaders are Xerox Corp., Motorola, Inc., and BellSouth Corp.

Xerox, for example, spends over $300 million per year for training and retraining its employees, says Gary Aslin, director of Xerox Document University, the company's major training facility. Located on 2,100 acres in Leesburg, Va., outside Washington, D.C., the university provides the bulk of the company's sales and service training.

One way Xerox is using newly flexible and well-trained workers is in a new plant called a "focus factory" in Rochester, N.Y. The company is building a new convenience copier, using teams of about seven workers each to build entire machines rather than having one long assembly line where each worker performs a single, repetitive task.

At Motorola, headquartered in Schaumburg, Ill., every employee is expected to take a minimum of 40 hours of job-related training each year. "Generally, engineers take well over the 40 hours because technology is changing so quickly," says Margot Brown, the company's media-relations manager.

About half of the information a software engineer learns in college is obsolete five years after graduation, she says. "Education is a way of life, and what makes our work force competitive is constant renewal of themselves and their skills." The training costs more than $100 million annually and is provided by Motorola University, the company's training arm.

BellSouth Corp., headquartered in Atlanta, also has made a huge commitment to the education, training, and retraining

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Information On Training

Following are useful sources of additional information on workplace training programs and issues.

Publications

Improving the Transition From School To Work in the U.S. This 40-page report describes the school-to-employment problem and outlines strategies for improving career preparation. Copies are available for $5 postpaid from the American Youth Policy Forum, Suite 301, 1001 Connecticut Ave., N.W., Washington, D.C. 20036-5541.

Corporate Quality Universities: Lessons in Building a World-Class Work Force, by Jeanne Meister, published by Business One Irwin, Homewood, Ill. This book, to be available in June and priced at $45, offers an in-depth examination of innovative education and training programs at 30 U.S. companies. It takes readers behind the scenes at such well-known corporate universities as Motorola University and Xerox Document University. To order, call 1-800-634-3966.

Bridging the Literacy Gap offers business leaders and the executives of local and state chambers of commerce detailed guidelines on how to establish literacy programs in communities and at work sites. It includes examples of both chamber-led and corporate-led literacy programs. For a copy, send a $5 check to the Center for Workforce Preparation and Quality Education, U.S. Chamber of Commerce, 1615 H Street, N.W., Washington, D.C. 20062-2000.

Training Partnerships: Linking Employers and Providers. This 47-page report looks at the provider community and how employer-provided relationships are developed and sustained. It attempts to help employers make more-informed decisions about purchasing provider training. Single copies are free from the American Society for Training and Development, 1640 King St., Box 1443, Alexandria, Va. 22313-2043; (703) 683-8129.

Seminars

Seminars on quality-management techniques and other business matters are being televised via satellite by the U.S. Chamber of Commerce. Small-business management topics include personnel management; basic financial management; employee benefits; and business owners' insurance. Quality-management topics include recognition, reward, and incentive programs; business process redesign; and quality strategic planning.

For more information about the seminars, call the U.S. Chamber's Quality Learning Services Division at (202) 463-5570.

Organizations

Jobs for the Future, a nonprofit group in Cambridge, Mass., is working to improve work-force quality in the United States. The group can provide business people with resources on apprenticeship programs. Contact Richard Kazis, Director of Work-Based Learning Programs, Jobs for the Future, 1815 Massachusetts Ave., Cambridge, Mass. 02140.

A. Wayne Rowley, of the Tulsa (Okla.) Chamber of Commerce, has helped coordinate business and education efforts to establish a youth apprenticeship program in his community. He can offer assistance on how local chambers can assist in establishing such programs. You can reach Rowley at the Tulsa Chamber of Commerce, 616 South Boston, Tulsa, Okla. 74119; (918) 585-1201.

Learning From Germany's Model

Apprentice Michael Dean's workday generally begins with a training session on the fundamental skills and techniques he will need as an electronic-communications technician.

This high-skilled job involves maintaining and repairing complex computing systems that make up telephone digital switching systems serving commercial and residential customers. His training involves learning how the computing systems are assembled, how they function, and how to repair them.

Five months into a new training program launched by Siemens Corp., Dean is working to perfect the soldering of electrical wiring onto a circuit board.

Siemens is a large company in fields that include electronics, electrical and medical engineering, and telecommunications.

"We are learning what quality soldering is and learning how to elevate our personal standards to a higher level," Dean says. "As we work on this, we can better visualize and understand what quality is."

Dean is an apprentice with Siemens Stromberg-Carlson in Lake Mary, Fla. Siemens Stromberg-Carlson, one of Siemens' operating companies in the United States, provides telephone operating companies with advanced, high-quality public telecommunications networks. Siemens Corp. also has started pilot apprenticeship programs at two other U.S. locations—Raleigh, N.C., and Franklin, Ky.

Dean, who was reared in California and has an associate's degree in arts and sciences, is learning the intricate details of this job from a German trainer in a new training center established by Siemens Stromberg-Carlson.

Each week, Dean spends 20 hours at the training center and takes approximately 20 hours in classroom courses at a local community college. There are 20 apprentices in the 2½-year apprenticeship program; most of them are younger than Dean, who is 41.

After completing two years of the apprenticeship program, Dean will receive six months of on-the-job training as a technician. Although he is not guaranteed a position with the firm, "we hope and anticipate that we will be able to hire every single apprentice in the program," says Gary Garman, Siemens' manager of training in Lake Mary.

PHOTO: BRUCE BORICH

High-technology training *is provided by Werner Franz, center, for Pawel Chrobok, left, and Michael Dean at Siemens Stromberg-Carlson in Lake Mary, Fla.*

Dean receives a monthly stipend plus money to cover all tuition and books for his required college courses while he is in the program. When he completes his course work, he will receive an associate's degree in science and engineering technology—an ASET.

Siemens Stromberg-Carlson is working in conjunction with Seminole Community College on this particular apprenticeship program.

The new training program is similar in many ways to the highly respected apprenticeship system in Germany, which Siemens has used with great success there.

Improving quality at all three sites was the primary reason behind launching the new training effort, says John Tobin, Siemens' director of vocational and technical training, and a former New York City principal. "You have to lay out the parameters of quality, and then you have to train workers to produce to that level."

While many European nations have successful apprenticeship programs, the German system, which has its origins in the 500-year-old crafts guilds of the Middle Ages, has attracted the most respect and attention in the United States.

About two-thirds of Germany's young men and women ages 16 to 19 participate in apprenticeship programs, working toward formal certification in about 380 different occupations.

German apprentices spend three or four days a week on a work site learning a craft and one or two days in technical school. It is called the "dual system" because it combines supervised work experience with part-time schooling. Apprentices receive stipends of about $500 a month.

At the end of a three-year apprenticeship, in which the training received meets standards agreed upon by employers and labor unions, the German trainees take a national exam and secure a certificate of mastery recognized throughout the country.

Individual German states fund the vocational schools, and the companies that take part in the nationwide program spend about 2 percent of payroll on it.

More than 50 percent of German apprentices remain employed with the companies that provided their training. Firms are not required to hire their apprentices, but many companies see an advantage in hiring employees whose personal characteristics and technical skills are known to them.

After completing their apprenticeships and working for several years, former apprentices can take additional instruction and pass another set of exams to become a "meister," which means master. They generally train other apprentices, and many own small businesses.

Attempts to establish a youth apprenticeship program in the U.S. are under way. The Labor Department has helped launch several youth apprenticeship pilot programs in a number of locations around the country.

Stephen Hamilton, a professor of human development and family studies at Cornell University, in Ithaca, N.Y., and an expert on the German apprenticeship model, notes that the success of a nationwide effort must secure the participation of employers. "Unlike school-based approaches to learning, youth apprenticeship absolutely requires the participation of employers."

While program supporters caution that the German system cannot simply be duplicated in the United States, they note that several characteristics—such as starting the program in high school and establishing skill certification—can be incorporated into a program here.

A nationwide program is likely to win the support of Congress; eight apprenticeship bills were introduced in the last congressional session, but election-year politics made consideration of those measures difficult.

Similar measures will be reintroduced in the 103rd Congress.

With the president's support, Congress is expected to pass youth-apprenticeship legislation sometime this year or next.

Continued from Page 28

of its work force. It offers training through its educational network, which makes use of distance learning. BellSouth, in conjunction with the Communications Workers of America labor union, has devised training programs with the help of labor and management.

"We think training and education, both on and off the job, is a real mainstay in our strategic position to be world-class," says William Shaffer, segment manager for BellSouth's training technologies.

In addition to the Communications Workers, others among organized labor, too, are keenly aware of the value of training. "Training in the construction industry—which is all done through apprenticeships—is probably one of the most important things we do," says Robert A. Georgine, president of the Building and Construction Trades Department of the AFL-CIO. In his view, "the collective bargaining system represents the best way to negotiate training requirements."

The AFL-CIO believes that joint labor-management action on work-related training is the best road to a high-skill, high-performance workplace where employees are empowered to participate in decision making.

The federal government also has a vast array of training programs. It currently spends over $16 billion a year on about 125 different employment training programs. (For details, see Page 25.) President Clinton has said the administration will assess the effectiveness of these programs to determine if they need to be better coordinated and streamlined.

The U.S. Chamber believes the delivery of federal job-training and welfare services should be coordinated into one-stop "skill centers" at the local level, says Joseph of the Center for Workforce Preparation and Quality Education.

In addition to streamlining current federal training programs, the administration has other ideas about improving the effectiveness of nationwide efforts. During his confirmation hearings, Labor Secretary Reich set four workplace goals:

- Providing a path to good jobs for the 75 percent of the nation's young people who do not complete four years of college and whose real wages have been declining.
- Helping workers who have been permanently displaced to get new jobs that pay at least as well.
- Fostering business organizations that create career ladders toward high-wage jobs, even for those individuals without university degrees.
- Encouraging the creation of good jobs that are good not only because they pay well but also because they provide a good work environment.

Displaced workers also will be high on the list for retraining efforts. According to one estimate, approximately 2 million displaced workers lose their jobs each year because of shifts in technology, trade, and conditions of competition.

For those who will enter tomorrow's work force, the administration is expected to establish a nationwide youth apprenticeship program. When he was governor of Arkansas, Bill Clinton set up a state youth-apprenticeship program. A number of other states, including Oregon, Pennsylvania, and Maine, also have apprenticeship programs. (For details on Germany's apprenticeship program, see Page 30.)

Although a U.S. youth apprenticeship system is still in the early stages of development, the traditional apprenticeship programs administered by labor unions have existed since the 1800s. Most of these apprenticeship training programs—mainly in the building trades—have been negotiated between employers and unions in collective-bargaining agreements. The main purpose has been to train workers in the various skills required by the building trades.

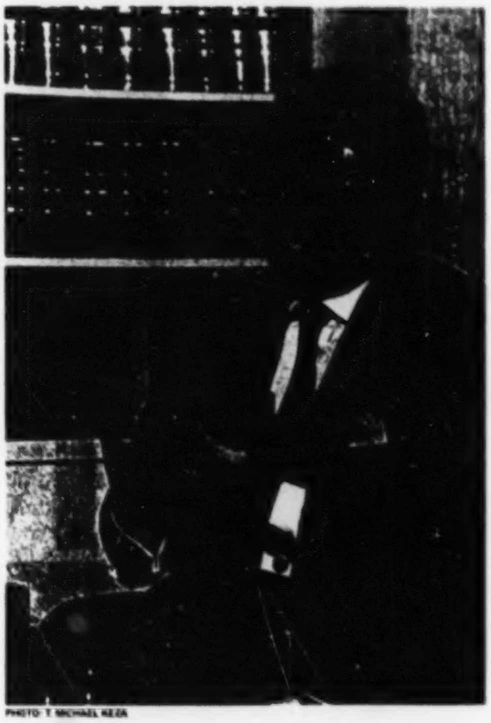


PHOTO: T. MICHAEL KEZA

Pat Choate: *Incentives for firms to encourage productivity would promote flexibility in training.*

Besides establishing a national apprenticeship system and initiating other training reforms, the administration may push for change in the way business and labor, as well as the federal government, spend their training funds. Labor Secretary Reich, for example, told the Senate Labor Committee that while U.S. firms spend an impressive $30 billion a year training their workers, "the problem is that $20 billion of that $30 billion goes to workers who already have university degrees, not to those who need it most. So we have to figure out how to concentrate those resources, both public and private, on the workers who need that continuous training and upgrading."

Among the key policy questions to be answered: How will federal training and retraining efforts be financed? In the past, Clinton suggested requiring businesses with more than 50 employees to spend a minimum of 1.5 percent of payroll on continuing education and training for all workers.

But in recent months, the president appears to have backed away from that idea in the face of opposition that includes small businesses concerned about the impact of yet another cost mandate from the federal government. Instead of a training tax, the Chamber proposes a tax incentive to encourage business to upgrade its workers' skills. The Chamber's proposed "human-capital initiative" would provide business with a tax credit similar to the tax credit recommended for businesses that invest in facilities and equipment.

"The country needs a pro-productivity set of incentives—an investment credit—that leaves enormous flexibility and choice to private firms on the type of training that is offered," says Pat Choate, a consultant and author of *The High-Flex Society*, a book that identifies problems facing industrial America and suggests a program of feasible solutions.

Choate says leaders of specific job-providing industries, such as motor vehicles, electronics, and textiles, together should decide a direction for the industry. "It is important that all the stake holders know their role and their reciprocal commitments and responsibilities," he says. Such collaboration would initiate long-term cooperative relationships.

President Clinton has said, "We must promote lifetime learning for every American, investing in our people at every stage." This renewed emphasis on education and training as a key to economic growth represents an important opportunity for business, labor, and government to work together to provide the skills necessary to enable U.S. companies to remain top competitors worldwide.

To order reprints of this article, see Page 80.

The Quality Leaders

By Michael Barrier

Small-business owners are the tightrope walkers of the American economy. Usually, they start onto the tightrope bearing terrific burdens; then they may slip and almost lose their balance; a gust of wind or a spot of grease may threaten to bring them down; sometimes they get overconfident and risk a nasty fall; and often, they must avoid the big banana peel that a clumsy government or a determined competitor has dropped in their path.

But, time and again, the good ones stay on the tightrope, and their footing is all the firmer for the dangers they've survived. For them, the exhilaration of life on the high wire more than makes up for the hazards.

That is the unmistakable message from three years of the Blue Chip Enterprise Initiative, sponsored by Connecticut Mutual Life Insurance Co., the U.S. Chamber of Commerce, and *Nation's Business*. Connecticut Mutual originated the program in 1990 as a way to help small businesses learn from one another's experiences. Every year, many hundreds of small businesses across the country submit applications describing the challenges

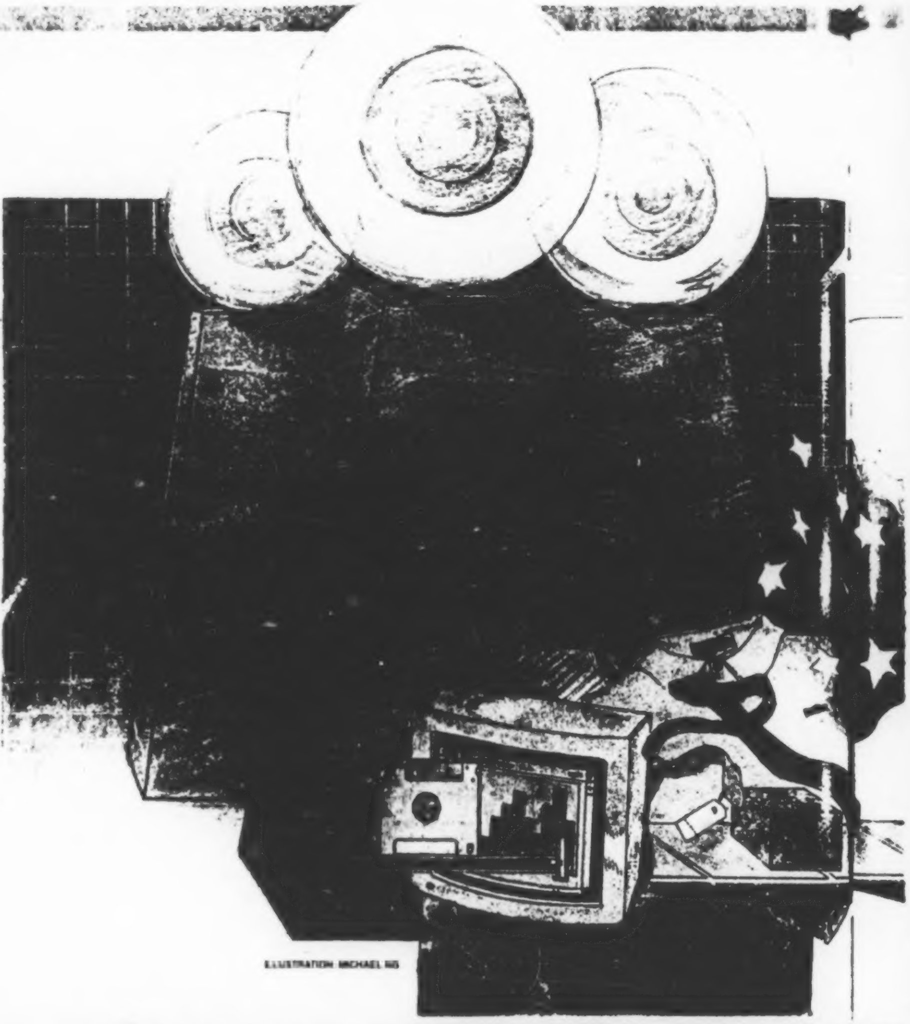


ILLUSTRATION: MICHAEL [illegible]

These are the Blue Chip Enterprise companies for 1993. The company chosen in each state for the national judging is listed first. The nature of the business is indicated when it is not evident from the company's name.

ALABAMA

Paul Griffin and Associates (office furnishings), and WDC Systems (computer systems for retailers), both of Birmingham; Jim Myers Drug (pharmacies), Tuscaloosa; East-West Transportation, Decatur.

ALASKA

Stephan's Tool Rental & Sales, Anchorage; Alaska Electric Light and Power, Juneau.

ARIZONA

CartridgeCare (remanufactured laser-printer cartridges), Scottsdale; Active Noise and Vibration Technologies (engineering) and the Phoenix Suns basketball team, both of Phoenix; T.C. Eggington's Brunchery (restaurant), Mesa.

ARKANSAS

Alliance Rubber Co. (manufacturer of rubber bands), Hot Springs.

CALIFORNIA

ICU Medical (manufacturer of disposable medical devices), Irvine; Auspex Systems (manufacturer of network file servers), Santa Clara; Vortex Industries (repairing warehouse doors), Costa Mesa; PM Entertainment Group (motion picture and video production), North Hills; Action Copier Service, Van Nuys; New El Rey Sausage Co., Vernon; SalesTalk (in-store product demonstrations), Mountain View.

COLORADO

Allwest Fire and Sound (distributor of fire alarms, pagers, intercoms) and Wynkoop Brewing Co. (restaurant), both of Denver; Alpine Banks of Colorado, Glenwood Springs; Front Range Plating (metal finishing), Englewood.

CONNECTICUT

Photronics (manufacturer of photomasks for semiconductors), Brookfield; DAPCO Industries (manufacturer of computerized ultrasonic inspection equipment), Ridgefield; Tony March Buick/Saturn, Hartford; Pa-Ted Spring Co. (manufacturer of springs and stampings), Bristol.

DELAWARE

Artesian Water Co., Newark; Harry S. Wilson Inc. (insurance), Wilmington; Blue Coat Inn (restaurant), Dover; K-Video Productions, Claymont.

DISTRICT OF COLUMBIA

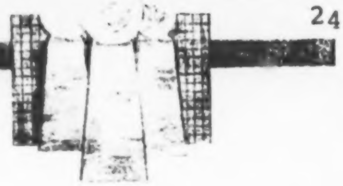
Lisboa Associates (communications consulting, conference planning), Corporate Visions (computer-generated visual presentations), and Hayward International (public relations, conference planning), all of Washington.

FLORIDA

Ekkwill Waterlife Resources (aquaculture), Gibsonton; Lawn Contractors, Bradenton; Sun Pharmaceuticals Ltd. (manufacturer of skin-care products), Pompano Beach; Payroll Transfers (employee leasing), Tampa.

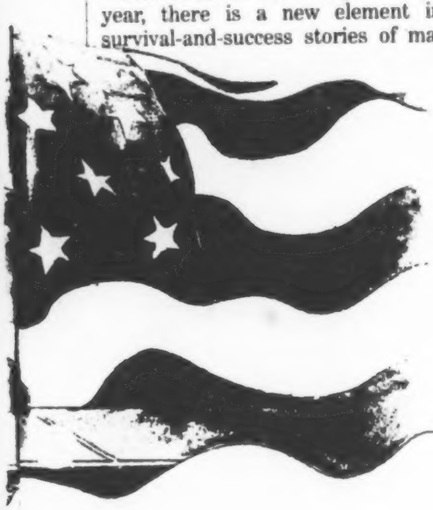
GEORGIA

Veit Inc. (wholesaler), Tucker; Cheshire Pet Supply, Tucker; IKKA Technology (plastics), Villa Rica; SpectraLogic (product development), Atlanta.



Many of 1993's Blue Chip Enterprises have used the tools of quality management to survive—and succeed.

they faced, and how they surmounted them. It is those applications that tell the story of life on the high wire.



For all of the continuity from year to year, there is a new element in the survival-and-success stories of many of 1993's Blue Chip Enterprises: a stronger emphasis than ever before on the tools of quality management. For many small businesses, quality management—with its overriding emphasis on customer satisfaction—has always come naturally.

The great prophets of the quality movement, like W. Edwards Deming, J.M. Juran, and Philip B. Crosby, have in many cases put into words what the most successful small-business people have known instinctively.

This year, as in the past, many Blue Chip designees have pursued what were in fact quality-management programs, without that label. But now more and more small businesses are consciously adopting the quality movement's language and techniques.

In the third year of the program, 198 small businesses received the coveted Blue Chip Enterprise title. Of those designees, 52—one from each state, the District of Columbia, and Puerto Rico—were chosen to go on to the national judging. Four emerged from the final round as National Blue Chip Enterprises and were invited to receive their trophies at the U.S. Chamber's National Business Action Rally in Washington, D.C., Feb. 23.

A full report on those four national designees—the challenges they faced, and how they overcame them—will appear in next month's *Nation's Business.*

As in the first two years of the program, all 198 companies will be profiled in a widely distributed book, and the 52 top designees will be presented through segments on "First Business," the morning news show broadcast on the USA cable network and sponsored by the Chamber and Connecticut Mutual.

The TV segments will be gathered on videotapes and made available to small businesses nationwide, with the cooperation of state and local chambers.

As lessons from the Blue Chip Enterprise Initiative make small businesses aware of promising solutions to common problems, it's likely that a growing number of small firms will be drawn to formal quality programs. For many firms, such programs will be a way of doing even better what they're already doing. As one Blue Chip designee puts it, "Before we knew what quality management was, we practiced it." NB

HAWAII

T & T Electric, Hilo; Hidano Construction, Honolulu.

IDAHO

Idaho Chemical Industries (plastics manufacturer), Fisher's Office Products, and Andrus-Shane Ltd. (retail women's wear), all of Boise; Lloyd Lumber Co., Nampa.

ILLINOIS

Airmax (transportation management services), Des Plaines; Dash Electrical Merchandising Co., Elk Grove Village; MYCO (manufacturer of point-of-purchase displays), Rockford; ComputerLand, Downers Grove.

INDIANA

Old Hickory Furniture Co. (manufacturer), Shelbyville; Ritz Charles Inc. (banquet and conference facilities), Carmel; Ran-Paige Co. (manufacturer of fabricated metal products), Sellersburg; Brown Equipment Co. (distributor), Fort Wayne.

IOWA

Clean Duds (coin-operated laundries), Des Moines; Mike Brooks Inc. (trucking), Knoxville; Health Care Expert Systems (software), West Des Moines; PM Systems Corp. (pavement construction), Hiawatha.

KANSAS

Interconnect Devices (manufacturer of equipment for testing circuit boards), Kansas City; Professional Printing of Kansas, Emporia; Western Kansas Xpress (transportation), Wichita; The New Theatre Co. (dinner theater), Overland Park.

KENTUCKY

Discount Office Interiors, Louisville; Danesh Enterprises (restaurant) and Major Distributing Co. (appliances), both of Paducah; Universal Waste Co. (environmental services), Mayfield.

LOUISIANA

Michaul's Live Cajun Music Restaurant, New Orleans; Dixie Glass Co., Opelousas; Guico Machine Works, Marrero; Spectrum Unlimited (medical journals), St. Rose.

MAINE

Cormier Equipment Corp. (rental and sales), Oakland; Wright Express Corp. (commercial credit cards), South Portland; Woodworth's Printing Emporium, and Artist and Craftsman Supply, both of Portland.

MARYLAND

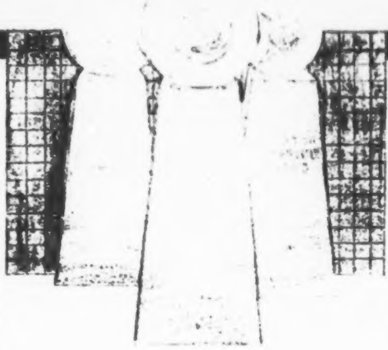
Wye River Inc. (manufacturer of food products), Queenstown; LaCrista Inc. (manufacturer of skin-care products), Davidsonville; Blazie Engineering (manufacturer of products for the blind), Forest Hill; Absolute-Care Ambulance Service, Baltimore.

MASSACHUSETTS

The Softbridge Group (software), Cambridge; Steve Connolly Seafood Co. and Zoom Telephonics (modem manufacturer), both of Boston; Boston Development Associates Construction Co., Westwood.

MICHIGAN

Great American Grubbslingers, Bloomfield Hills; Grand Rapids Spring & Wire Products, Grand Rapids; Eagle Alloy



(steel castings), Muskegon; Grand Aire Express (charter airline), Monroe.

MINNESOTA

Comprehensive Rehabilitation Center (therapy), Edina; C.J. Olson Market Research, Minneapolis; Digi International (data communications hardware and software), Eden Prairie; Landscape Structures (playground equipment), Delano.

MISSISSIPPI

Shelby Die Casting Co., Shelby; Sound Advice (VCR express repair), Gulfport; Cleveland's Car Repair, Columbus; Management Dynamics Ltd. (personnel agency), Jackson.

MISSOURI

American Delivery Service, Advanced Nursing Services, and L.G. Zambrana Consultants (civil engineering), all of St. Louis; Heifner Communications (cable-TV program broker), Columbia.

MONTANA

CVR/Montana Furniture Galleries (manufacturer and retailer) and Bridger Foundry and Gallery (bronze sculptures), both of Bozeman.

NEBRASKA

Design Basics (home plans), Omaha; O'Brien & Co. (manufacturer of meat snacks), Bellevue; Certified Transmission, Omaha; Preferred Physicians Insurance Co., Omaha.

NEVADA

Port of Subs (sandwich shops) and Dennis Banks Construction Co., both of Reno; Water Safety Corp. of America (manufacturer of water purification systems), Sparks; Somers Convention Furniture Rental, Las Vegas.

NEW HAMPSHIRE

Computer Service Supply Corp., Londonderry; Paragon Publishing Systems (software development), Bedford; La Meridiana Restaurant, Wilmot; Bretton Woods Ski Area, Twin Mountain.

NEW JERSEY

Camelot Consulting Group, Fairfield; American Lease Exchange (computer leasing), Cherry Hill; A-1 International Courier, Union; Country Day Schools, Somerville.

NEW MEXICO

Lite Cookies Ltd. (manufacturer), Deming; Pimentel & Sons Guitarmakers, Smith Engineering Co., and Billings and Associates (environmental consulting), all of Albuquerque.

NEW YORK

Frisby Airborne Hydraulics (manufacturer of hydraulic subsystems and assemblies), Freeport; D/C Mechanical Corp. (heating and air conditioning contractor) and Rice Aircraft (distributor of aircraft parts), both of Hauppauge; Optimation Technology (engineering and software design), Rush; Three Village Inn (restaurant and motel), Stony Brook; E.G. Bowman Co. (insurance), New York City.

NORTH CAROLINA

GBA Systems (computer consulting), Colfax; 5G's Manufacturing (clothing), Pembroke; Tyler II Construction, Charlotte; LabStaffers (temporary personnel for clinical laboratories), Greensboro.

NORTH DAKOTA

F.F. Fisher Leasing Corp., Fargo; Leingang Siding and Window, Mandan.

OHIO

J.B. Dollar Stretcher Magazine (direct-mail advertising), Richfield; Cleveland Track Material (manufacturer of railway equipment), Cleveland; Sovereign Circuits (manufacturer of multilayer circuit boards), North Jackson; Dimco-Gray Co. (plastics manufacturer), Centerville.

OKLAHOMA

Handmade Rainbows and Halos by Amelia (hair accessories), Lamar; Ward Petroleum Corp. (oil and gas production), Enid; Eateries Inc. (restaurants), Oklahoma City; Gen-Star of Oklahoma (rebuilder of starters and alternators), Durant.

OREGON

Marion's Carpet, Rentrak Corp. (videocassette distributor), and Consolidated Business Machines, all of Portland; Central Homes (manufactured housing), Woodburn.

PENNSYLVANIA

Girton Manufacturing Co. (washing equipment), Millville; Labels By Pulizzi (printed labels), and Neece Paper Co. (distributor), both of Williamsport; Arrow Terminal Co. (materials handling), Industry.

PUERTO RICO

Western Steak & Pizza & Mexican Food, Mayaguez; Marmoles Vassco (manufacturer of marble tiles and tables), Ponce; Mirabal & Associates (public relations, advertising), Mayaguez; Southwestern Farmers Inc.-Fruti Natural (fruit juices), Lajas.

RHODE ISLAND

Mearthane Products Corp. (manufacturer of polyurethane components and assemblies) and Blazing Graphics, both of Cranston; Federal Investment Co. (home building), East Providence; Tanury Industries (metal finishing), Lincoln.

SOUTH CAROLINA

U.S. Personnel, Columbia; Professional Rehabilitation (therapy), Easley; Precision Southeast (custom injection molding), Myrtle Beach; The Bank of South Carolina, Charleston.

SOUTH DAKOTA

RPM & Associates (rebuilt equipment), Rapid City; Dakota Granite Co. (quarry), Milbank; Bid-Well Corp. (manufacturer of paving equipment), Canton.

TENNESSEE

West Rents NationaLease (truck and trailer leasing), Nashville; Hypertech (manufacturer of computerized engine controls), Omega Travel, and R.L. Campbell Contracting Co., Memphis.

TEXAS

Triad Protective Services (security guards), Carrollton; Houston Creative Connections (technical personnel placement) and Institutional Real Estate Services, both of Houston; C-Power Products (manufacturer of power-related products), Rockwall; American Glove & Safety (retailer), Victoria; Brice Foods (yogurt shops), Dallas; Westway Ford, Irving; Minco Technology Labs (hybrid microcircuits and semiconductors), Austin.

UTAH

JoLene Co. (clothing manufacturer), Provo; Sahara Inc. (construction), Bountiful; Le Bus (bus transportation), Salt Lake City; Quantronix (manufacturer of cubing and weighing systems for air cargo), Farmington.

VERMONT

Qualitad (manufacturer of plastic packaging), Rutland; LineSync Architecture and Planning, Wilmington; Burlington Square Opticians, Burlington; Creative Carpentry (wooden lawn furniture), Ferrisburgh.

VIRGINIA

United Power Corp. (manufacturer of computer power conditioning equipment), Eskimo Pie Corp., and Young Cos. (transportation and warehousing), all of Richmond; Environmental Testing Services, Norfolk.

WASHINGTON

Studio 904 (hair design), Innovision (training), and Seattle Massage School, all of Seattle; Swift Transcription (medical transcribing), Spokane.

WEST VIRGINIA

Petroleum Development Corp. (oil and gas wells), Bridgeport.

WISCONSIN

Valley School Suppy (distributor), Appleton; Racine Travel Service and Travel Institute, Racine; George Watts and Son (retail china, silver, crystal) and Bagel Boy Bakery and Deli Co., both of Milwaukee.

WYOMING

Kennon Protective Coverings (manufacturer of aircraft sun shields), Sheridan.